MARINE MAMMAL COMMISSION

Annual Report to Congress 2012

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2012

Marine Mammal Commission
4340 East-West Highway, Room 700
Bethesda, Maryland, 20814

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Marine Mammal Commission

Committee of Scientific Advisors on Marine Mammals

Special Advisor on Native Affairs

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Cover photograph: Bowhead whales (*Balaena mysticetus*) in the Arctic
Photo Credit: Amelia Brower, Alaska Fisheries Science Center, NOAA Fisheries Service
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Introduction

Title II of the Marine Mammal Protection Act (the Act) created the Marine Mammal Commission as an independent federal agency to oversee activities of federal agencies directly or indirectly affecting marine mammals and to advise those agencies of actions needed to fulfill the intent and provisions of the Act, i.e., to maintain the health of marine ecosystems and the marine mammal populations that are integral components of marine ecosystems.

The Commission's oversight and advisory role helps ensure that the domestic and international policies and actions of federal agencies are consistent with the Act and other legislation related to maintaining a healthy marine environment. Because many marine mammals feed at high trophic levels, are long-lived, and are subject to some adverse health impacts similar to those that affect humans, they have the potential for providing a warning about certain kinds of adverse changes to or degradation of the marine environment—that is, for some situations, they can be "sentinels of the sea."

Multiple human-related risk factors affect marine mammals, including direct and indirect effects of fisheries; the introduction of anthropogenic sound, contaminants and diseases into the marine environment; harmful algal blooms, dead zones and other habitat alterations; vessel strikes; and impacts of climate change. The Commission consults with other federal agencies, including the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the Departments of State and the Navy, the Bureaus of Ocean Energy Management and Safety and Environmental Enforcement in the Department of the Interior, state agencies (e.g., various Departments of Fish and Game), and Tribes and Alaska Native Organizations (e.g., the Indigenous People's Council on Marine Mammals), to characterize those risk factors and identify cost-effective solutions. The Commission also helps develop, facilitate, and coordinate domestic and international research and management initiatives to promote marine mammal protection and conservation. In all its work, the Commission seeks to be a source of useful information; focused and catalytic research funding; and independent, objective, and forward-looking advice and oversight.

Organizational Structure

The Commission consists of (1) three Commissioners appointed by the President and confirmed by the Senate, one serving as Chairman; (2) a nine-member Committee of Scientific Advisors on Marine Mammals appointed by the Chairman in consultation with the Director of the National Science Foundation, the Secretary of the Smithsonian Institution, the Chairman of the Council on Environmental Quality, and the Chairman of the National Academy of Sciences; and (3) a staff of 14 full-time employees, including the Executive Director, who is appointed by the Chairman with the approval of the other Commissioners.

The Commission's Duties under the Marine Mammal Protection Act

Title II of the Act specifies the duties of the Commission and its Committee of Scientific Advisors on Marine Mammals. The Commission's strategic goals and objectives are based on these seven duties, as defined under section 202 of the Act:

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 Fur Seal Act of 1966;
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 the Marine Mammal Protection 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 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 [of Commerce or the Interior] 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 [of Commerce or the Interior], other appropriate federal officials, and Congress such additional measures as it deems necessary or desirable to further the policies of the Act, including provisions for the protection of the Indians, Eskimos, and Aleuts whose livelihood may be adversely affected by actions taken pursuant to the Marine Mammal Protection Act.

In implementing its duties, the Commission plays a key role in the development of policies and strategies designed to ensure the conservation of marine mammals to maintain them as functioning elements of healthy marine ecosystems. The Commission coordinates with several federal agencies on science and conservation matters. Regular ongoing activities of the Commission staff, under the guidance of the Commissioners and the Committee of Scientific Advisors, ensure the scientific and policy input of the Commission is reflected in a wide array of actions, including—

- reviewing permit and incidental take authorization applications, proposed regulations, National Environmental Policy Act documents, and Endangered Species Act listing proposals (more than 140 recommendation letters were submitted in FY 2012);
- developing or reviewing marine mammal policy and guidance documents;
- producing reports to Congress and relevant agencies of particular importance to the conservation of marine mammals and maintenance of healthy ecosystems;
- reviewing results of research, providing funding for research, and identifying significant gaps in ongoing research and seeking ways to close such gaps;
- participating in scientific and policy organizations and meetings, both domestic and international; and
- conducting the Commission's annual meeting to review pressing issues.

These activities, which may focus on marine mammal species or populations of the greatest concern, ensure that the Commission is meeting the duties laid out in its mandate, with a particular emphasis on the oversight of science and conservation conducted by the major federal agencies that engage in activities relating to marine mammals.

The 40th Anniversary of the Marine Mammal Protection Act[1]

The year 2012 marked the 40th anniversary of the Marine Mammal Protection Act and also the 38th anniversary of the Commission. The Marine Mammal Protection Act was one of a series of federal environmental laws enacted in the United States in the late 1960s and early 1970s in response to the then-growing awareness that human activities were threatening the natural resources and ecosystems upon which the welfare of humans depends. In the years leading to passage of the Act, only one issue—the Vietnam War—generated more mail from the public to members of the U.S. Congress. The history of implementation, judicial interpretation, and amendment of the Marine Mammal Protection Act since its inception reflects the course of marine mammal conservation in the United States over the past 40 years.

In the debate surrounding the original enactment of the legislation, three issues were of particular concern to Congress, the scientific community, and the public: (1) the deaths of hundreds of thousands of dolphins each year in the eastern tropical Pacific Ocean as a result of setting purse seines around dolphin schools to catch yellowfin tuna that associate with the dolphins; (2) the failure of the International Whaling Commission to prevent the over-exploitation and near-extinction of virtually all stocks of large whales throughout the world; and (3) the clubbing and skinning of tens of thousands of newborn harp seals each year in the ice fields of the North Atlantic for the international fur market.

Over the past four decades, new challenges have arisen in the conservation of marine mammals, and these are reflected to some extent in amendments to the Act. Of ongoing concern are declines in the abundance of species and stocks in both U.S. and international waters, including West Indian and West African manatees, southern sea otters, the southwest Alaska stock of northern sea otters, Steller sea lions, Hawaiian and Mediterranean monk seals, killer whales (orcas), vaquitas, and Asian freshwater dolphins. Additional challenges are presented by offshore oil and gas development, commercial fisheries, subsistence harvests, unusual mortality events, ocean pollution, marine debris, ship strikes, human sources of ocean sound, and ecosystem alteration due to climate change. As some marine mammal stocks have recovered as a result of being protected under the Act, new and different issues have emerged, such as increased predation on protected fish stocks by pinnipeds, primarily at dams where fish become concentrated during migration to spawning sites up river, and conflicts with human activities such as access to beaches and docks and commercial and recreational fisheries.

In response to the need to address interactions between fisheries and marine mammals more effectively, Congress enacted major amendments to the Act in 1994. These changes were developed with input from the fishing industry, the environmental community, and the government, including the Commission. The amendments established procedures to regulate takes in commercial fisheries in order to minimize the impact on marine mammals. The requirements include regular status reports and determination of strategic stocks of marine mammals (supported by regional scientific review groups), and the development of fishery take reduction plans by take reduction teams composed of scientists, resource managers, fishermen, and other stakeholders. Although not without some controversy, the system established by the 1994 amendments to the Marine Mammal Protection Act to govern marine mammal/fishery interactions has often worked effectively both to regulate the taking of marine mammals incidental to commercial fisheries in U.S. waters and to minimize the impact of the regulations on the affected fisheries.

Congress also took action in 1992 to amend the Act to establish the Marine Mammal Health and Standing Response Program (Title IV). At the time, there was a growing awareness of marine mammal

1 This discussion is drawn, in part, from a review of past issues in marine mammal conservation written by John R. Twiss. Jr., the Executive Director of the Marine Mammal Commission from 1975 to 2000; Robert J. Hofman, the Commission's Scientific Program Director from 1976 to 2000; and John E. Reynolds, III, past member and Chairman of the Commission's Committee of Scientific Advisors on Marine Mammals and Chairman of the Commission from 1991 to 2010. The review is included in the volume, *Foundations of Environmental Sustainability: The Co-Evolution of Science and Policy*, published by Oxford University Press in 2007. The Commission gratefully acknowledges Oxford University Press for its kind permission to use portions of that work.

strandings and a network of volunteers had been developed to respond to these events. Because of difficulties in responding to and understanding the causes of marine mammal die-offs, such as those along the Atlantic coast in 1987–1988, Congress passed legislation that would, among other things, establish an expert working group, develop contingency plans, determine criteria for release of stranded animals, and establish tissue banks and databases. In addition, in December 2000 Congress enacted the Marine Mammal Rescue Assistance Act directing National Marine Fisheries Service and the Fish and Wildlife Service to initiate grant programs to improve the effectiveness of the stranding networks. Grants provided under the Prescott Program complement this network by providing financial assistance for recovery and treatment of live-stranded animals, collection and archiving of data from both live and dead stranded animals, and the operational costs directly related to those activities. Grants may be awarded for up to three years with a cumulative total of $100,000 per eligible participant per year.

Since the Marine Mammal Protection Act was enacted, there has been substantial progress in addressing a number of marine mammal and marine ecosystem conservation issues. However, several issues have resisted solution, and a number of new or previously unrecognized—and sometimes controversial—issues have arisen. These include the uncertainty concerning the direct and indirect effects on marine mammals of climate change and ocean acidification, the continuing controversy concerning the effects of anthropogenic sound on marine mammals and other marine organisms, and the cumulative effects of stressors on marine mammal populations. The future of marine mammal conservation depends on the willingness and ability of government agencies, international organizations, affected industries, and public interest groups to work together to anticipate and find solutions to conservation problems that are both biologically and economically sound. The Commission has played a key role in facilitating and encouraging such collaborative efforts since its establishment in 1974 and looks forward to contributing in a similar fashion to address ongoing and emerging challenges.

Capitol Hill Oceans Week

The Commission worked with the National Marine Sanctuary Foundation and other partners to organize a special session commemorating the 40th anniversary of the Marine Mammal Protection Act as part of Capitol Hill Oceans Week 2012. The session focused on the continuing relevance of the Act and what must be done to ensure that it remains effective in the future.[2] An introductory overview by Dr. John Reynolds, Mote Marine Laboratory and former Chairman of the Marine Mammal Commission, made the case that there have been mixed results in achieving conservation of marine mammals. While there has been progress in addressing direct threats to some species, some researchers conclude that the future for marine mammals is tentative. Lack of scientific information is not the main impediment to conservation but rather society's willingness to take the actions necessary to protect marine mammals. Effective use of regulatory and enabling tools is more likely to lead to successful results, particularly if stakeholders are part of the process to consider alternative solutions. The presentation by Dr. Tim Ragen, then Executive Director of the Commission, provided a sense of the increase in the cumulative impact of the many growing threats to marine mammals, including fishery bycatch and habitat degradation due to sound, hypoxia, harmful algal blooms, contaminants, direct degradation and climate change. Dr. John Bengtson, Director of the National Marine Fisheries Service's National Marine Mammal Laboratory, made the case that lack of scientific data and research requires a precautionary approach that may result in overly conservative restrictions on commercial activities. New technological approaches to scientific research, such as satellites, remote sensing, and unmanned aircraft, can contribute to knowledge of marine mammals and opportunities for mitigating human impact. Ms. Karen Steuer, Pew Charitable Trusts, discussed the evolution of the Marine Mammal Protection Act and key legislative changes over time to respond to changing ocean conditions. She stressed the need for stronger outreach to emphasize

2 Presentations can be found at http://www.nmsfocean.org/CHOW-2012-agenda.

the link between human activities and marine mammal health. Finally, all speakers pointed to the need to ensure public awareness and engagement on marine mammal issues in order to improve the likelihood of meeting conservation goals.

U.S. Fish and Wildlife Service National Climate Adaptation Strategy

The draft National Fish, Wildlife, and Plants Climate Adaptation Strategy, prepared by the Fish and Wildlife Service, was announced in the *Federal Register* on 20 January 2012 (77 Fed. Reg. 2996). The Marine Mammal Commission reviewed the document and provided extensive recommendations and comments in a 5 March 2012 letter to the Service, starting with the recommendation that the Service modify the strategy to reflect that climate change is primarily caused by humans, in contrast with previous periods of change. The Commission also recommended that the strategy include a realistic assessment of the potential for non-human species to adapt to the many changes that will occur as a result of climate change, as well as the ability and willingness of humans to protect the habitat and ensure the survival of impacted species and ecosystems. The need for research to characterize and manage these impacts was also raised, along with the need to provide the resources necessary to conduct this work. In particular an emphasis on assessing and managing the cumulative impacts of human activities in the Arctic is required. Changes in seasonal ice conditions resulting from climate change are directly impacting Arctic marine mammals even as they open the way for an increase in industrial activities, such as oil and gas exploration and shipping which in turn may impact marine mammals. Finally, the Commission underscored the important role that innovation can play in meeting these many challenges. The final version of the report was expected to be released in early 2013.

Chapters in the 2012 Report

Chapter II describes the challenges presented by the rapidly changing environment in the Arctic, which was the focus of the 2012 annual meeting, held in Anchorage, Alaska, on 24–26 January 2012. The Arctic warrants special attention because it is changing more rapidly than elsewhere on earth due to climate change and the related increase in human activities as the Arctic warms and the extent, thickness, and seasonal duration of sea ice decrease. This is 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, molting, hunting, reproduction, and refuge from predators. The long-term consequences of ecosystem-scale changes, including the emerging threat of ocean acidification, remain uncertain for other species. Arctic species may also be affected by a variety of more immediate human activities, including fishing, shipping, and energy exploration and production. This chapter also considers Arctic/Alaska species of special concern, including bowhead whales, polar bears, and the North Pacific right whale. In addition to concern over the impacts of human activities on the species upon which they depend, the economic opportunities available to Alaska Natives through commercial development in the Arctic will need to be carefully managed so as not to affect the subsistence and cultural value of marine mammals to Native communities.

Chapter III highlights those non-Arctic species that the Commission considers to be of special concern, which are generally those listed as endangered or threatened under the Endangered Species Act or depleted under the Marine Mammal Protection Act. Such species (Arctic species of special concern are discussed in Chapter II) include North Atlantic right whales, Hawaiian monk seals, southern sea otters, and Florida manatees. The status of each of these species may be affected by a variety of human activities or the consequences thereof.

Chapter IV highlights species of special concern in foreign or international waters. It also addresses work under various multilateral and bilateral organizations such as the International Whaling Commission, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the Arctic Council.

As a group, freshwater dolphins are perhaps in greatest need of attention, particularly in Southeast Asia. On a single-species basis, the vaquita is con-

sidered by many authorities to be the marine mammal 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 all gillnets in the vaquita range with other gear that will not entangle and drown vaquitas. Alternative vaquita-friendly trawl nets have been developed, and conservation of this species appears to depend heavily, if not entirely, on efforts to make the transition from gillnets to these new nets. The transition is urgent because surveys indicate that fewer than 200 individual vaquitas remain. The United States has an important responsibility to fulfill 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. This chapter ends with an update on the Commission's efforts to develop a global assessment of marine mammals; the assessment will be based to a large extent on reviews conducted by the Species Specialist Groups convened by the International Union for Conservation of Nature.

Chapter V focuses on ocean energy and marine mammals. It includes a follow-up to the special feature in the 2010–2011 report on the *Deepwater Horizon* oil spill. Updates are provided on the injury assessment and restoration planning activities related to the *Deepwater Horizon* spill and on the outlook for marine mammal species in the Gulf of Mexico. The chapter provides a summary of oil and gas activities in U.S. waters, impacts of oil and gas development on marine mammals, and regional approaches to addressing research, mitigation, and monitoring needs. Finally, alternative energy issues are discussed, as these can pose new, but also difficult, challenges for marine mammal conservation.

Chapter VI addresses marine mammal health and stranding response, including trends in these events, administrative developments in the various programs and networks, and updates on the Prescott Grant Program. The information gained from stranded animals is essential, as it provides valuable insight into marine mammal health and disease and the health of the marine environment. In particular, such studies have been critical to investigating marine mammal unusual mortality events (UMEs) that occur in U.S. coastal regions. When a marine mammal stranding occurs in a populated coastal area, public concerns are raised over the cause and potential human health impacts, whether direct (i.e., sick and dying mammals on the beach) or indirect (i.e., implications for water quality or seafood safety).

Chapter VII describes interactions between fisheries and marine mammals. 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 sound in the marine environment. It is critical to recognize that most marine mammals depend primarily on hearing for many of their activities, including feeding, reproduction, predator avoidance, and migration. Low-frequency sound can travel thousands of kilometers underwater from its source. Major sources of human-generated sound include commercial shipping, military activities, geophysical surveys, and coastal development (e.g., pile driving and removal). In the past decade, concerns regarding introduction of sound into the marine environment have led to a marked increase in studies related to potential effects from sound. Underwater sounds produced by marine mammals can be used as an assessment tool (e.g.,

passive acoustic monitoring). The main concerns with regard to human-generated sounds are that they may injure marine mammals (including injuries that may, in extreme cases, lead to death), alter behavior in ways that affect an animal's ability to survive and reproduce (e.g., decreased foraging efficiency, change in habitat-use patterns, disruption of mother-offspring bonds), or mask important sounds upon which marine mammals depend (e.g., for detecting predators or potential mates).

Chapter IX describes the Commission's research program and the research activities it supported in 2012. It also reports on the results of the Survey of Federally Funded Marine Mammal Research and Conservation undertaken by the Commission for Fiscal Year 2009. Appendix B of this report lists the 2012 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.

Chapter X describes applications for various permit actions and incidental take authorizations reviewed by the Commission in 2012. The Commission reviews those applications and provides its recommendations and rationale to the appropriate regulatory authority (i.e., the National Marine Fisheries Service, Fish and Wildlife Service, or National Science Foundation).

Finally, Appendix A of this report includes a complete listing of 2012 recommendations made by the Commission to other federal agencies and the associated agency responses and Appendix B includes a complete listing of all publications in 2012 resulting from Commission-sponsored activities.

Chapter II

SPECIAL FOCUS ON MARINE MAMMALS IN THE ARCTIC/ALASKA

Over the past decade the Arctic marine environment has received increasing attention, in large part due to the impact of climate change 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 areas and species affected by environmental change and the activities underway to monitor and mitigate the losses, especially with regard to marine mammals and their habitats.

The Arctic continues to attract widespread interest by scientists and constituents alike because it is changing more rapidly than other places on earth, due to climate impact and the related increase in human activities as the Arctic warms and sea ice area, thickness and seasonal duration decrease. This is degrading the habitat of a number of marine mammals (e.g., polar bears, walruses, ringed and bearded seals) that use sea ice and snow for resting, molting, hunting, reproduction, and refuge from predators. Arctic species may also be affected by a variety of human activities (e.g., commercial fishing, shipping, energy production, coastal development) or the consequences thereof. This chapter considers Arctic/Alaska species of special concern, including northern sea otters, polar bears, and the North Pacific right whale. The economic opportunities available to Alaskan Natives through commercial development in the Arctic will need to be carefully managed so as to not affect the subsistence and cultural value of marine mammals to Native communities.

Impact of Climate Change

The effects of climate change on physical, chemical, biological, and human components of the Arctic ecosystem are myriad, far-reaching, and accelerating. These global-scale effects are driven by the warming of the atmosphere and oceans. This warming is almost entirely a result of an increase of greenhouse gases in the atmosphere which scientists attribute primarily to human activities, particularly the use of fossil fuels (IPCC 2007).[1] The warming has caused a cascade of physical changes to the Arctic environment, from primary (direct) effects such as the melting of sea ice and sea level rise, to secondary (less direct) effects such as decreased albedo (surface reflectivity) and coastal erosion, to tertiary (indirect) effects such as the accelerated warming of the ocean due to positive feedback loops between different climate factors (Figure II-1). In addition, the increase of carbon dioxide (CO_2) in the atmosphere has led directly to an increased concentration of CO_2 in the ocean, and its chemical derivatives have caused increased acidity (decreased pH) of the water—known as ocean acidification—and "wholesale shifts in seawater carbonate chemistry" (Doney et al. 2009). At each stage in the cascade of physical and chemical changes, biotic components of the ecosystem are affected.

1 "[T]here is a strong, credible body of evidence, based on multiple lines of research, documenting that climate is changing and that these changes are in large part caused by human activities." National Research Council 2012

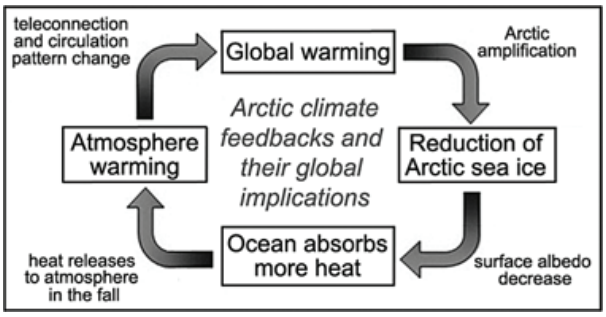

Figure II-1. Arctic climate feedbacks (from Overland et al. 2011).

The Atmosphere

The Arctic atmosphere has warmed more than that of any other part of the planet, a phenomenon known as Arctic Amplification (Serreze et al. 2008). Since the 1960s, the annual mean Arctic atmospheric temperature has increased rapidly and steadily by more than 2.0°C; the increase in annual mean over the last century has been roughly 2.5°C (Figure II-2). While increased air temperatures may have direct impacts on the physiology of some marine mammals, it is the indirect effects on their environment and prey, such as the loss of sea ice habitat that is important to ice seals, walruses, and polar bears, that may be the most important.

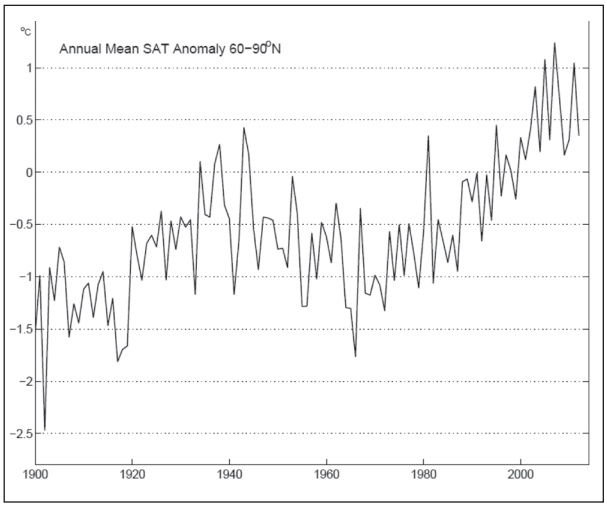

Figure II-2. Arctic annual mean air temperature anomalies from 1900 to 2011.[2]

Sea Ice

In the Arctic, the most visible, and potentially most important, effect of global warming has been the loss of sea ice (Figure II-3). The end-of-summer sea ice minimum, which was reached on 16 September 2012, was the lowest on record and 18 percent lower than the previous record, which occurred in 2007 (Perovich et al. 2012). The sea ice minima in the years from 2007 to 2012 were the six lowest in the record, which extends back to 1979, and the last 10 years included 9 of the 10 lowest sea ice years (Figure II-4). The sea ice minimum has been declining since the beginning of the time series (-13 percent per decade since 1979), but the appearance of much lower values in the last six years suggests that the rate has accelerated or that the system has undergone a state shift (Perovich 2011).

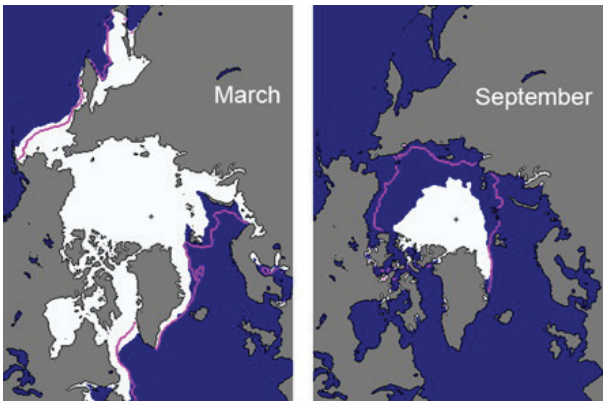

Figure II-3. Sea ice minimum (September) and maximum (March) extent in 2012, with the median maximum and minimum ice extents for the period 1979–2000 (magenta lines) (Perovich et al. 2012).[3]

The seasonal ice extent is only part of the picture—its geographic distribution, characteristics, and age structure (e.g., annual vs. multi-year ice) are also critical to Arctic marine biota and Native communities. The reduction of summer sea ice has been most

2 Temperatures based on data collected north of 60 degrees from 1900 to 2011 (data from 2012 were not completely available by the end of 2012); anomalies were computed as annual mean for each year minus the mean temperature from 1981 to 2010 (zero on the vertical axis). Source: 2012 Arctic Report Card, available online at http://www.arctic.noaa.gov/report12/temperature_clouds.html (Accessed 6 Nov. 2013)

3 Source: 2012 Arctic Report Card, available online at: http://www.arctic.noaa.gov/report12/sea_ice.html (Accessed 6 Nov. 2013)

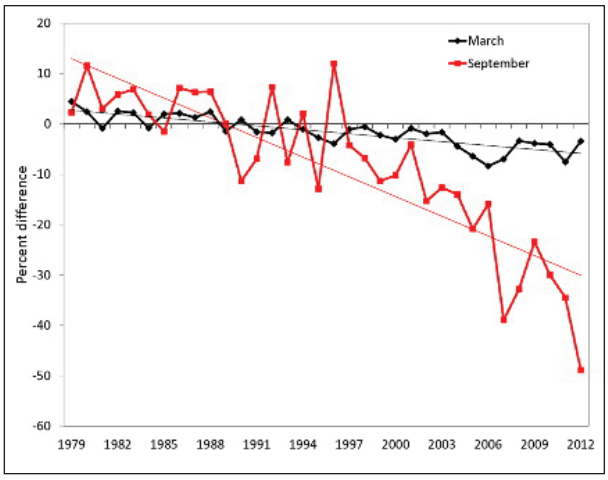

Figure II-4. Time series of the percentage difference in ice extent in March (black) and September (red) relative to the mean values for the period 1979–2000 (Perovich et al. 2012). The decline in ice extent was roughly linear in the first part of the time series (1979 to 1997), but the rate of change appears to have increased after 1997.[4]

severe off western Canada and Alaska in the Beaufort Sea, between Alaska and Siberia in the Chukchi Sea, and off eastern and central Russia in the East Siberian and Laptev Seas (Figure II-5). Whereas as recently as 1980 the pack ice remained very close to the coast in Alaska and Siberia, in recent years it has retreated hundreds of kilometers offshore by the end of summer. Similarly, in 1980, ice remained throughout the year in the Canadian Archipelago in the eastern Arctic, but now it regularly retreats from the southern part of the archipelago.

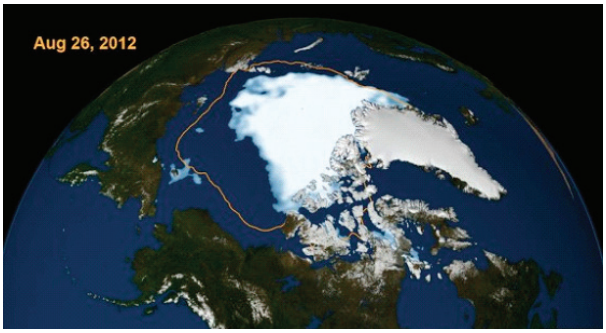

Figure II-5. Arctic 2012 sea ice minimum relative to the median minimum from 1979–2010.[5]

In addition, statistics on ice extent do not reflect the changes in the character and age of the ice, which have important ramifications for ice-dependent species. In 1980 the edge of the ice was compact, mostly consolidated pack ice, but now it is a heterogeneous mixture of dispersed multi-year ice floes and open water. There has been a substantial loss of older, thicker, more resilient ice in the last three decades, and the loss has accelerated since 2005, part of a shift from perennial to seasonal ice cover (Figure II-6; Perovich 2011). Sea ice reaches its greatest extent in March. In March 1988, 26 percent of the sea ice in the Arctic was more than four years old, but in 2012 that number had dropped to just 7 percent (Perovich et al. 2012).

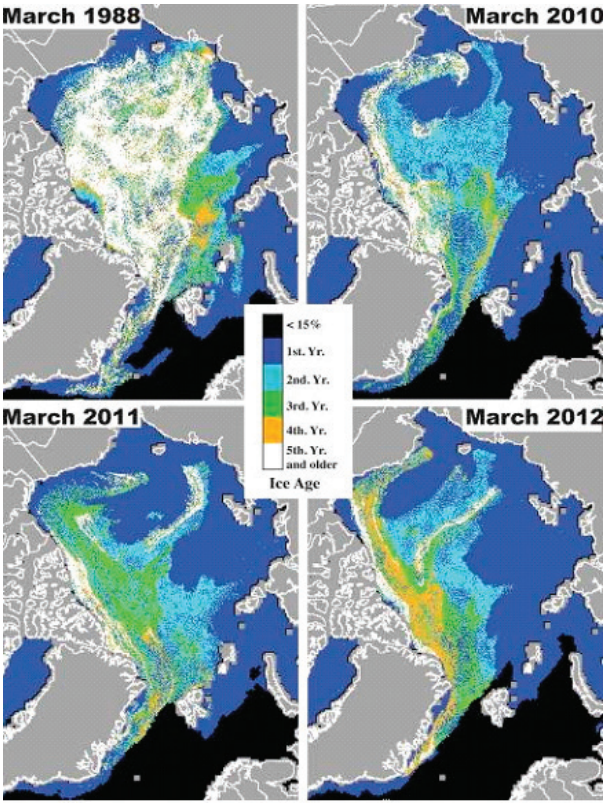

Figure II-6. March extent of different age-classes of sea ice, derived from satellite tracking data collected from 1988 to 2011.[6]

4 Source: 2012 Arctic Report Card, available online at: http://www.arctic.noaa.gov/report12/sea_ice.html (Accessed 6 Nov. 2013)

5 Image available online at: http://www.huffingtonpost.com/2012/09/12/arctic-ice-melt-extreme-weather_n_1878833.html (Accessed 7 Nov. 2013) (Source: NASA/JPL).

6 Source: 2012 Arctic Report Card, available online at: http://www.arctic.noaa.gov/report12/sea_ice.html (Accessed 6 Nov. 2013)

Sea Level Rise

Increased temperatures have had other effects on the marine environment. Global warming has led to the melting of glaciers and polar ice sheets and the thermal expansion of the oceans, both of which have contributed to sea level rise (Cazenave and Llovel 2010). Although there has been considerable interannual and inter–decadal variation, monitoring stations in Siberia have revealed an average 2.7mm/yr rise in sea level over the period 1954–2011 (Figure II-7; Timmermans et al. 2012). With longer ice-free periods along coastlines, increased sea level, and the observed occurrence of increased storminess (Hakkinen et al. 2008), coastal erosion is expected to increase, most likely to the detriment of coastal wildlife habitat and coastal settlements (Jones et al. 2009, Walsh 2008). The susceptibility of Arctic coasts to erosion is also exacerbated by the warming and melting of permafrost underlying coastal land.

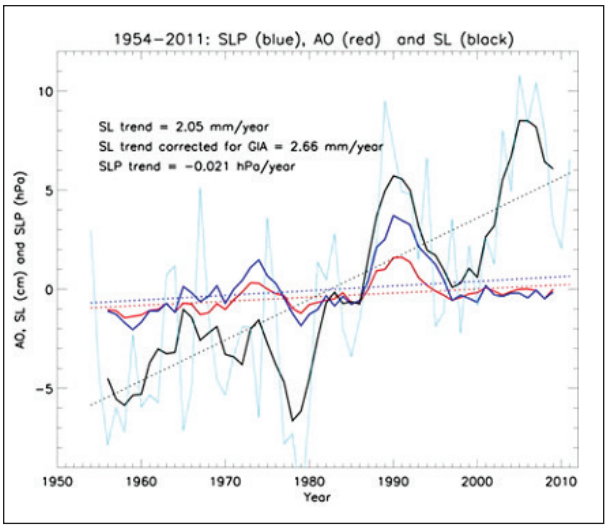

Figure II-7. Mean sea level in the Kara, Laptev, East Siberian, and Chukchi Seas (five-year running mean) (solid black line) with linear trend (dotted black line).[7]

7 Other lines provide information on the annual sea level anomalies, Arctic Oscillation index (AO), and sea surface atmospheric temperature (SLP); see details in the source: 2012 Arctic Report Card, available online at: http://www.arctic.noaa.gov/reportcard/ocean.html#sea_level (Accessed 24 Jan. 2014)

Arctic Marine Positive Feedback Loops

The loss of sea ice has had secondary physical effects. Snow and ice have a much higher albedo than water, which means that as the extent of open water has increased in the Arctic, so has the absorption of sunlight by the ocean. This has contributed to a positive feedback loop; as more sunlight is absorbed, the surface temperatures of the Arctic Ocean increase, leading to greater melting of sea ice, which creates more open water, more sunlight absorption, and so on (Overland 2011).

Arctic storms are known to contribute to the break-up and melting of sea ice (Perovich 2012). The more open water there is, the greater the fetch (i.e., the distance over which storms can amplify waves). The increase in wave and swell intensity affects the continuity of the ice, breaking up solid ice and spreading out the pack. This further increases the extent of open water, and again extends the fetch, in another feedback loop that accelerates changes to the Arctic environment. Storms also strongly influence upwelling along the continental slope of the Beaufort Sea, whereby heat, nutrients and (potentially) zooplankton can be transported from deep water onto the continental shelf (Pickart et al. 2009). This dynamic impact to shelf-slope-basin exchange caused by storms is measurable whether or not sea ice is present.

Economic Opportunities

Declines in the amount and thickness age of sea ice in the Arctic Ocean and seas are creating more opportunities for human activity in many spheres. In much of the Arctic, the earlier disappearance of sea ice from coastlines coupled with and the ice's retreat farther from shore during the summer and tendency to remain offshore longer in the fall means there is now a large, growing seasonal window of open water. This creates opportunities for oil and gas exploration and development, shipping, tourism, commercial fishing, and military operations, as described later in this chapter. There is also an increase in scientific efforts to understand and predict the impact of climate change. These activities expose Arctic marine mammals to a variety of threats, including ship

strikes, pollution, entanglement in fishing nets or lines, and exposure to anthropogenic sound and other forms of disturbance that previously either had been absent or had been present only on a much smaller scale.

Ocean Acidification

In addition to contributing to the greenhouse effect and global warming, more CO_2 is dissolving in the ocean, where it is altering the chemistry of sea water. While the uptake of CO_2 by the oceans has so far been a moderating factor to global warming, the increasing ocean acidification has profound implications for marine ecosystems (Fabry et al. 2008, Doney et al. 2009). It is well established that increased concentrations of CO_2 in the ocean are reducing the availability of calcium carbonate to shell-forming marine organisms. In much of the ocean's surface waters, where most productivity starts, calcium carbonate is supersaturated. When the supersaturation state declines, shell-forming organisms may have some difficulty in taking up the calcium carbonate that they need, and the dissolution of existing calcium carbonate structures may occur. While it is predicted that this will, by and large, hamper shell formation, not all groups of organisms respond similarly and some may even increase shell formation (Fabry et al. 2008, Ries et al. 2009). The solubility of calcium carbonate is affected by temperature, with saturation states lowest in cold water, meaning that Arctic and sub-Arctic ecosystems are likely to experience the impact of acidification sooner than most temperate and tropical regions (Fabry et al. 2008). Recent research has discovered under-saturated, potentially corrosive waters in the Arctic, including on the continental shelf of the Chukchi Sea (Mathis 2011). Local areas with strong upwelling that bring deep, cold, under-saturated water onto the continental shelf are also at increased risk; this phenomenon has been documented in temperate areas but not yet in the Arctic.

While much of the early research on the potential effects of ocean acidification on biological systems focused on tropical corals and coral reefs, research has expanded in recent years to include other ecosystems and high latitudes. Although marine mammals are not expected to be directly affected by the altered ocean chemistry and increased acidity, they do depend on organisms that will be affected. The effects on primary producers will vary; increased CO_2 concentrations may lead to increased primary photosynthetic production, but some primary producers, such as coccolithophores, have calcium carbonate shells and thus their production may be inhibited. Coccolithophores are not generally found in the Arctic, but unusual blooms have occurred recently in the sub-Arctic (Bering and Barents Seas) from whence they could expand into the Arctic with further warming. It is not known what the net effect of these opposing aspects of increased CO_2 will be on coccolithophores, which illustrates the complexity of the problem of predicting the impact of climate change on living organisms. The diets of some Arctic marine mammals (e.g., walruses, bearded seals, ringed seals, and gray whales) are strongly dependent on benthic molluscs with calcium carbonate shells and crustaceans with skeletal structures that incorporate calcium carbonate (Bluhm and Gradinger 2008). Pelagic crustaceans, such as mysids, euphausids and copepods, may be affected directly or indirectly through effects on the plankton they consume, which could have consequences for bowhead and gray whales that rely on these crustaceans for food. Shelled pelagic molluscs, called pteropods, are important prey in some high-latitude, pelagic food webs and suffer reduced calcification in water of higher than normal acidity (Comeau et al. 2009).

Ecosystem Impact of Climate Change

With decreased and thinner seasonal sea ice cover, and a longer period of open water, increasing solar irradiance is reaching Arctic surface waters with sea ice loss caused by climate change, and this is predicted to increase primary production by as much as two or three times current rates (Arrigo et al. 2008). Analysis of satellite data from the first decade of this century suggests a 20 percent increase in net primary productivity in the Arctic, especially in the southern Chukchi and Beaufort Seas, but the regional changes in productivity have not corresponded exactly to sea ice loss rates (unpublished data from K. Frey, Clark University, cited in Moore and Grebmeier 2012). In

2011, contrary to historic expectations, massive phytoplankton blooms were observed under thin sea ice cover in the Chukchi Sea (Arrigo et al. 2012). It is not yet known to what extent such under-ice blooms might be controlled by the thinning of sea ice or how the increases in primary productivity suggested by these observations might propagate through food webs. Further, primary productivity has been shown to be 1.5 to 2 times greater near sea ice edges than in open water (Frey et al. 2012).

The shift in seasonal sea ice coverage has the potential to change the structure of the shelf ecosystem in the Chukchi and Beaufort Seas by altering the pattern of primary production (Wassmann and Reigstad 2011). Fundamental changes that could occur are likely include a shift from light limitation to nutrient limitation of primary producers (e.g., Arrigo et al. 2008), and a shift from a benthic to pelagic-focused food web (Moore and Grebmeier 2012). Historically, north of Bering Strait, algae associated with sea ice have contributed more to primary production than have pelagic phytoplankton. Sea ice- associated primary production was exported to the sea floor (part of what is called pelagic-benthic coupling; Grebmeier et al. 2012) supporting a critical benthic food web in which demersal fish, sea ducks, walruses, bearded seals, and gray whales consume molluscs, crustaceans, and other invertebrates. Conversely, in the southeastern Bering Sea to the south, pelagic phytoplankton dominate primary production and support a pelagic food web that includes zooplankton, fish, seabirds, bowhead whales, and gray whales (Moore and Grebmeier 2012). As seasonal sea ice coverage declines in the Chukchi and Beaufort seas, it is possible that ecosystems will shift from benthic to pelagic dominance with concomitant changes in the abundance and distribution of fish, seabirds, and marine mammals. Some evidence of such changes already has been detected with phytoplankton blooms occurring earlier, carbon transport to the benthos declining by 30 to 50 percent, and shifts in species composition in some regions (Moore and Grebmeier 2012). In addition, changes in species composition are resulting from seasonal incursions or range expansions of Bering Sea species (e.g., Rand and Logerwell 2010). These changes are likely to benefit some species and have a negative impact on others; scientists are still working to figure out what the impacts will be and how they will vary among species, ecosystems and regions.

A literature review by Wassmann et al. (2010) summarized published observations of apparent climate change impacts on Arctic marine organisms. They found 51 documented impacts on everything from phytoplankton to whales, with most of the examples involving marine mammals. These illustrate the fundamental nature and breadth of change already observed for Arctic species and ecosystems as expressed through range shifts and changes in abundance, growth/condition, vital rates, behavior/phenology and community/regime shifts and suggest the potential extent of future Arctic ecosystem perturbation. Further, these studies illustrate the potential for marine mammals and their populations to serve as sentinels to the ecosystem shifts (Moore 2008).

Impact of Climate Change on Arctic Marine Mammals

For millennia the Arctic marine environment has been dominated by the polar ice cap and its dynamics (Laidre et al. 2008, Polyaka et al. 2010, Kovacs et al. 2011). In winter, virtually the entire Arctic Ocean and its marginal seas are mostly ice covered, with the ice extending into the adjacent sub-Arctic seas. In summer the seasonal ice largely disappeared from the sub-Arctic and pulled away from some Arctic coastlines. Even at the height of summer, however, ice covered much of the Arctic Ocean in the past. This perennial ice was complex, varying in thickness, age, and degree of consolidation. Conditions would vary from areas with a solid, thick sheet of ice, to areas of broken pack ice of varying degrees of consolidation, to open water. Beyond the pervasive influence of the ice, the Arctic has been shaped by the cold and strong seasonality in incident light. The cold and lack of light for much of the year is associated with an unproductive environment with few top predators, while in the summer constant sunlight and warmer temperatures result in a strong pulse of productivity, without which few, if any, marine mammals would have been able to evolve and thrive there. Although there is still a sharp contrast between win-

ter and summer, it is becoming less pronounced as Arctic warming diminishes the seasonal extent of ice cover and extends the period of productivity.

Arctic adaptations: Arctic marine mammals have adapted to this complex, extreme, and seasonally varying environment, becoming highly specialized at using different habitats for reproduction, foraging, molting, and migration in different seasons (Kovacs and Lydersen 2008, Gilg et al. 2012, Harington 2008). Several authors have classified Arctic marine mammals with respect to their degree of specialization (Harington 2008, Laidre et al. 2008, Moore and Huntington 2008). Laidre et al. (2008) recognized those species "that occur north of the Arctic Circle for most of the year and depend on the Arctic ecosystem for all aspects of life" as the most highly Arctic-adapted species—bowhead whale (*Balaena mysticetus*), beluga (*Delphinapterus leucas*), narwhal (*Monodon monoceros*), walrus (*Odobenus rosmarus*), bearded seal (*Erignathus barbatus*), ringed seal (*Pusa hispida*), and polar bear (*Ursus maritimus*). Moore and Huntington (2008) also recognized this grouping but split it into the "ice-obligate" species (polar bear, walrus, bearded and ringed seal) and the "ice-associated" species (bowhead whales, beluga, and narwhal). Moore and Huntington's "ice-associated" group also included the other northern ice seals—harp (*Pagophilus groenlandicus*), hooded (*Cystophora cristata*), ribbon (*Histriophoca fasciata*) and spotted (*Phoca largha*). Laidre et al. (2008) classified these same four seal species as sub-Arctic species that occupy the Arctic seasonally but do not depend on it year-round. Harington's (2008) single "core" Arctic group was the same as the core group recognized by the other researchers, with the addition of the harp seal.

For the core Arctic species, sea ice may be both a barrier to movement and a source of protection from predators (e.g., killer whales) and shelter from storms and cold. Competitors and disease organisms are few, the associated ecosystems are highly productive in summer, and modern human threats (e.g., from commercial fishing, shipping, oil and gas) have been largely absent (Ragen et al. 2008, Gilg et al. 2012). Climate change has the potential to change all of these elements and in the process make Arctic marine mammals more vulnerable.

Environmental changes and impacts: As warming in the Arctic has progressed, the quality and quantity of sea ice have changed (Stroeve et al. 2008, Wang and Overland 2009). Changes to sea ice are not occurring alone—they are accompanied by a broad suite of oceanic and atmospheric changes, including changes to stratification that have the potential to affect marine mammals and their responses to the loss of sea ice (Kovacs et al. 2011).

These changes to Arctic sea ice represent a loss of quantity (reduction in ice extent or coverage) and quality (sea ice fragmentation, deterioration, and altered seasonality) of marine mammal habitat (Laidre et al. 2008), with profound consequences for species that depend on sea ice (Kovacs and Lydersen 2008). Such consequences may be manifested through both reduced fitness of individual animals and altered population parameters (Laidre et al. 2008). It is not known to what extent Arctic seals, most of which do not now, to any appreciable extent, use land haul-outs, have the behavioral plasticity to switch from using sea ice to land as a haul-out substrate or to make other behavioral adaptations to changing conditions (Kovacs and Lydersen 2008).

The effects of climate change will not be geographically uniform, and, therefore, the viability and persistence of marine mammal populations are expected to vary regionally across the Arctic depending on the degree of sea ice loss, the persistence of sea ice refugia, and the likelihood that regional food webs will change both by local production and advection of nutrients and prey from the south (Moore and Huntington 2008). Because sea ice loss has already been much more extensive in the Pacific Arctic sector and is expected to continue in advance of other areas, ice-obligate species may decline in number and/or adapt as coastal habitats disappear there, but remain relatively unaffected in the Canadian Archipelago where the perennial ice is expected to persist the longest (Moore and Huntington 2008). Although most authors have emphasized known and expected negative impacts on Arctic marine mammals (e.g., Burek et al. 2008, Kovacs and Lydersen 2008, Laidre et al. 2008, Huntington 2009, Evans et al. 2010, Wasserman et al. 2010, Kovacs et al. 2011), some species may benefit from climate change in the Arctic, or there may be variability in the impact on populations

of a given species with some suffering adverse impacts while others experience no change or even more favorable conditions.

Arctic marine mammals will not only experience the direct impact of habitat loss, but they will also be affected indirectly as the food webs and ecosystems on which they depend undergo extreme changes. Restructured food webs, changes in the size, density and distribution of prey populations, the appearance of less lipid nutritious prey species, and the appearance of new predators, competitors, and new pathogens that can survive in the more temperate open-water conditions will challenge the Arctic species (Burek et al. 2008, Kovacs and Lydersen 2008, Reygondeau and Beaugrand 2011, Gilg et al. 2012).

Climate adaptation: Arctic marine mammals are "K strategists" that have evolved over multiple periods of climate change (Harington 2008). They are long-lived and reproduce slowly, adaptations that produce individuals resilient enough to persist through large, short-term environmental fluctuations (Laidre et al. 2008). The current episode of climate change is producing rapid environmental changes in time periods within the long generation times of many Arctic marine mammals, making it unclear whether many species will evolve quickly enough to keep up with the changes (Berteaux et al. 2004, Skelly et al. 2007, Gilg et al. 2012). Some Arctic species may benefit from climate change, at least in the short-term (e.g., bowhead whales), but those that are negatively affected may suffer reduced population size or even local extinction.

In the short term, phenotypic responses—behavioral and physiological accommodations—will be the primary mechanism for climate adaptation by Arctic marine mammals (Gilg et al. 2012). Gilg et al. (2012) believe there will be two primary pathways of phenotypic response—shifts in phenology[8] and shifts in range. The first involves altering the timing of activities (e.g., migrating earlier to take advantage of earlier habitat or resource availability or reproducing earlier to stay synchronized with peak prey productivity), and the second, tracking ideal conditions as they shift northward as the Arctic warms.

In a highly seasonal environment, with a rapid onset to a short window of high productivity, timing is all-important for most species (Berteaux et al. 2004). In the Arctic, migration and reproduction (particularly the production of offspring) are critically timed to coincide with peak availability of particular habitat or resources (e.g,. concentrations of preferred prey). If Arctic species are to breed successfully and survive through the periods of low food availability, then they must take timely advantage of the periods of high productivity. As warming alters the timing of preferred prey and the availability of critical habitat, Arctic marine mammals will have to adjust their annual cycles accordingly (Gilg et al. 2012). This potential "mismatch" of predators, such as marine mammals and the resources on which they depend, is considered a serious threat for many species (Berteaux et al. 2004, Durant et al. 2007), especially if they are dependent on endogenous "biological" clocks that are synchronized with physical phenomena that are not similarly changing (e.g., day length). However, warming is also likely to increase productivity and to extend the window of prey availability, which may lessen to an unknown extent the effect of mismatch.

The capability for phenotypic response is limited and the speed and extent of climate change may overwhelm the behavioral and physiological plasticity of many species (Gilg et al. 2012). As temperatures increase, Arctic species will be pushed toward the boundaries of their environmental or climate envelopes, compromising their physiological performance, immune competence, foraging efficiency, growth, and reproductive success (Pörtner and Farrell 2008). In theory, Northern Hemisphere species are expected to shift their ranges northward in response to warming to stay within the climate envelope to which they are adapted, and/or to avoid new competitors, predators, diseases, or human activities (Kovacs et al. 2011, Gilg et al. 2012). However, warming will create many environmental changes, not all of which will be strictly related to latitude.

Evidence is accumulating of sub-Arctic species extending their ranges into the Arctic (see references in Laidre et al. 2008, Moore and Huntington 2008, Wassmann et al. 2010). However, little evidence exists of Arctic species shifting their ranges, perhaps

8 Phenology as a biological trait, rather than a field of study, is "the seasonal timing of animal and plant activities" (Berteaux et al. 2004).

indicating that this is not a viable option for many Arctic marine mammals, that changed habitat conditions are still suitable for their needs, or simply that we have not yet invested enough research time to detect such shifts. There is, however, considerable evidence that several Arctic species had ranges extending south as far as Long Island, New York, and London, England, during past ice ages. This suggests that their distributions must have shifted northward between ice ages as the climate warmed (see references in Laidre et al. 2008).

Although in theory individual animals respond to changing conditions to some degree with behavioral and physiological adjustments, and these adjustments should result in a measureable species-wide response, there is little evidence of this for Arctic marine mammals to date. Rather, scientists are beginning to see declines in physiological and reproductive performance of some Arctic marine mammals (e.g., see references in Laidre et al. 2008, Kovacs et al. 2011), suggesting that they have much less ability to compensate than previously thought, that their capacity for compensation has been exhausted, or that such compensation has simply not yet been detected. There are, of course, exceptions. For example, the population of bowhead whales in the Beaufort and Chukchi Seas may be larger than it was before commercial whaling began, the population of beluga whales in the Beaufort Sea appears to be growing, and despite significant sea ice loss Chukchi polar bears are in good condition and reproducing well (R. Suydam, pers. comm.).

Any single study cannot easily demonstrate conclusively that population-wide changes in reproductive parameters, for example, are the result of climate change. However, single studies can link such parameters with environmental changes that are similar to what is predicted to occur with climate change. For example, Stirling et al. (2008) found in the middle of the first decade of this century that polar bears in the southeastern Beaufort Sea experienced poor foraging success and were in poor body condition, consistent with nutritional stress. It also appeared that the mortality rates of these bears were higher than expected. These observations were correlated with periods of unusually rough and unstable sea ice extending tens of kilometers from shore and an unprecedented extent of open water in the Beaufort Sea likely associated with the Arctic warming trend. In an earlier study, Stirling and Smith (2004) had found that ringed seal pups suffered high mortality in a year with an unusually early, warm, and rainy spring, apparently because their subnivean birth lairs collapsed.

As the ocean and atmosphere warm, Northern Hemisphere animals might be expected to shift their ranges ever northward, all the way to the North Pole. However, for Arctic marine mammals, the benefits of northward range shifts are limited. By simple geometry, an animal/population moving north to remain in particular preferred conditions will find less area to occupy as it approaches the pole (Gilg et al. 2012). In actuality, the primary habitat requirements of many Arctic marine mammals are centered on the continental shelves distributed around the southern continental margins of the Arctic Ocean. Northward range shifts would put continental shelf-dependent species over the deeper, less-productive, central Arctic Ocean, which is assumed to be inhospitable for them. Shelf-dependent Arctic marine mammals do not have the option of moving north as water warms or as sea ice retreats northward. These species are faced with ever-diminishing habitat that meets their reproductive, foraging, and thermal needs (both in terms of access to continental shelf resources and seasonal sea ice substrates). As illustrated by the situations of ringed seals and Pacific walruses, described later in this chapter, this is predicted to lead to population declines and possibly to extirpation from large parts of these animals' current range (Kelly et al. 2010).

While each type of environmental change (e.g., warming, ice loss, increased storminess, food-web reorganization) and human activity (e.g., oil and gas development, fishing, shipping, etc.) has discrete potential impacts, their cumulative impact may exceed the ability of these species to respond. Kovacs and Lydersen (2008) concluded that "it is certain that ice-breeding seals will have marked, or total, breeding-habitat loss in their traditional breeding areas and will certainly undergo distributional changes and in all probability abundance reductions," and that

over decadal time scales, individual populations will be lost and over longer time scales entire species could go extinct.

Potential impacts: Relatively few studies have yet documented changes in marine mammals that can be attributed with certainty to climate change, but several papers have addressed the potential impact of Arctic climate change on Arctic marine mammals (e.g., Kelly 2001, Kovacs and Lydersen 2008, Laidre et al. 2008, Moore and Huntington 2008, O'Corry-Crowe 2008, Ragen et al. 2008, Huntington 2009, Evans et al. 2010, Kovacs et al. 2011). Those papers have largely focused on the potential negative outcomes for Arctic species, but they acknowledge that much remains to be learned about which species and populations will be affected, when, where, and to what extent they will be affected, and which species or populations will instead benefit from climate change.

Moore and Huntington (2008) suggested that there will be winners and losers in the Arctic. They drew a distinction between the potential fate of what they called "ice-obligate," "ice-associated," and "seasonally migrant" species (Figure II-8). They argued that the impact of climate change on ice-obligate species will be driven by the loss of sea ice, although the degree of impact will depend on several factors. Laidre et al. (2008) categorized species by their degree of dependence on different types of ice. While Moore and Huntington classified belugas as ice-associated, Laidre and colleagues emphasized that loose annual pack ice and polynyas are critical to this core-arctic species. They pointed out that dense annual pack ice is critical to polar bears, walruses, and bearded seals, but that what is most critical to ringed seals is shorefast ice. Without a platform on which to rest, breed, and/or hunt, it is not clear how these species will be able to adapt. Ringed seals rarely haul out on land and depend on subnivean lairs that include breathing/escape holes for access to foraging areas and protection from polar bears. While in a small number of populations, ringed seals do haul out on land during ice-free periods, none pup on land. It is difficult to see how they would make the leap from pupping in subnivean dens on ice to pupping on land or how that could be a viable adaptation in the presence of polar and grizzly bears, Arctic foxes, and wolves. In the absence of sea ice, polar bears would be forced to hunt more on land, but they may face increasing competition from terrestrially adapted grizzly bears.

Because food is not uniformly available to polar bears throughout the year, they rely on nutritional reserves during periods of low prey availability. As access to preferred hunting habitat declines, polar bears are going to become nutritionally challenged, suffer physiologically, and, in extreme cases, starve. In some areas, polar bears are already showing signs of stress from the decreases in ice cover. Regehr et al. (2007) found that a three-week shift toward earlier spring breakup of the sea ice from 1984 to 2004 (Stirling and Parkinson 2006), which would have likely reduced access to ringed seal pups, was associated with a decline in survivorship of juvenile, subadult, and senescent bears, and a 22 percent decline in population size. Polar bears in Hudson Bay forced ashore by breakup earlier in the spring

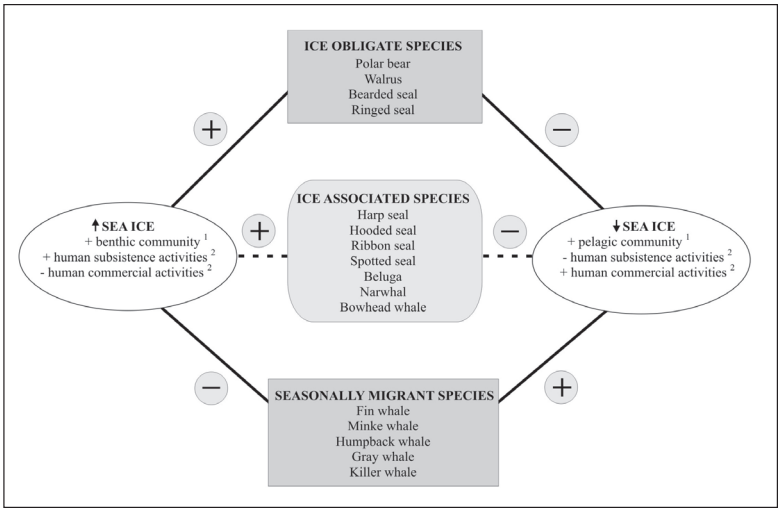

Figure II-8. Conceptual model of the impact of sea ice loss on marine mammals, according to their degree of dependence on sea ice (taken from Moore and Huntington 2008). Decreases in sea ice in this model result in a transition from benthic to pelagic dominance within the ecosystem, with negative consequences for ice-obligate and ice-associated species and positive consequences for seasonally migrant species.

have had less time to feed at a critical time of the year, and they tend to be in poorer condition (Stirling et al. 1999). Similarly, breeding rate and survival of adult females and cubs were lower in the southern Beaufort Sea during years with longer summer ice-free periods (Regehr et al. 2010). Conversely, in the Chukchi Sea where sea ice loss has been greater, polar bears are doing well (Rode et al. 2013), reinforcing the fact that climate change in the Arctic is complex and responses to its effects will not be consistent among species and populations.

Moore and Huntington (2008) argued that sea ice loss generally will have a negative impact on ice-associated species, but that predicting the outcome will be more difficult than for the ice-dependent species. It is more likely that the ice-associated species can adapt to open-water environments, although they might well lose some ground with regard to physiological performance, feeding efficiency, reproductive rates, and survival rates. In contrast, some species may benefit from the loss of sea ice, owing to the resultant increased primary and secondary productivity and potential of prey delivery from the south via advection. As climate change progresses, the relative coverage of different sea ice types will shift. A shift to thinner annual sea ice could benefit belugas, but negatively impact narwhals, which prefer dense pack ice in winter. However, predicting the net benefit or cost to any given species will be difficult. For example, narwhals wintering in Baffin Bay prefer dense pack ice with as little as 5 percent open water (Laidre and Heide-Jørgensen 2005), and a decrease in the extent of that habitat could force them into less desirable habitat. They are also dependent on polynyas and leads within the pack ice for access to air and, therefore, feeding habitats, but they sometimes perish in large numbers due to entrapment when sudden temperature drops or wind storms cause the ocean water to freeze over completely (Laidre and Heide-Jørgensen 2005).

Increased availability of open water in the Arctic already appears to be benefiting seasonal migrants and bowhead whales by giving them more access to rich feeding habitat. Large baleen whales in this category migrate north to take advantage of the high productivity in sub-Arctic seas and at the edge of the pack ice during the summer. As the sub-Arctic and Arctic warm, productivity hot spots may shift to or develop in the Arctic, and it is expected that these whales will follow. Gray whales have spent the winter in the Beaufort Sea, suggesting that they are opportunistic and able to take advantage of newly accessible resources (Moore and Huntington 2008).

Vulnerability to climate change: Because the Arctic environment is undergoing such complex, interconnected, and cascading changes, it is very difficult to know which species and populations are most at risk. Laidre et al. (2008) devised a nine-factor quantitative index to assess the sensitivity of Arctic marine mammals to climate change. The nine factors were population size, range extent, habitat specificity, diet diversity, migration frequency and extent, individual site fidelity, influence of changes in sea ice, influence of changes to the food web, and maximum rate of population increase. By the measure of this index, the most sensitive or vulnerable population would be one that is small and local, with a low intrinsic rate of growth, and whose individuals show strong site fidelity, have narrow habitat and diet preferences, and are strongly influenced by changes in the sea ice and food webs.

The aggregate score for each species (sum of scores across the nine factors) varied considerably. The four most sensitive species according to this index were the narwhal, polar bear, hooded seal, and bowhead whale. The next most sensitive were the beluga, walrus, and spotted, ribbon, and harp seals. The least sensitive species were the ringed and bearded seals. The authors noted that three species groups emerged from the analysis: those with relatively small ranges and narrow diets (narwhal and walrus), those dependent on seasonally restricted habitat—the marginal ice zone (hooded and harp seals), and the polar bear, which is dependent on annual ice near the southern edge of the pack ice. Habitat and diet generalists with extensive ranges and large populations were the least sensitive in their analysis (e.g., ringed seal). The sensitivity scores did not match well with categorizations based on the species' degree of specialization, nor did they coincide well with recent assessments under the Endangered Species Act, in which ringed and bearded seals were listed as threatened, but spotted and ribbon seals were not listed. This reinforces our lack of under-

standing of the drivers of vulnerability for these species.

The Future

There is no longer any credible scientific question about the existence, trajectory, or primary cause of climate change. There is considerable uncertainty, however, about exactly how severe it will be, how the severity of its impact will vary in space and time, how its effects will cascade through the biosphere, and how and to what degree various biological systems and human communities will experience and respond to impacts from climate change. At this stage, we know that profound changes are gathering in the Arctic. We can anticipate what they will be, but for the most part our ability to predict the spatial and temporal progression of physical changes and the responses of biological systems is not accurate enough to confidently manage the impact. Climate change and its impact will proceed whether we understand them or not, and the consensus of scientists at this point is that the impact will be profound, and will likely result in wholesale changes to the structure and functioning of Arctic ecosystems, to the condition and health of individual marine mammals, to the abundance and distribution of many species, and to the relationships between Arctic people and their environment. The course of change has been set in motion by human choices having been made, perhaps unwittingly, on a global scale, and that course cannot be changed without governments and societies making very different choices than they have to date. If the potentially catastrophic impact of climate change on some Arctic species is to be avoided, the source of the problem—greenhouse gas production—will have to be addressed. Regardless of the degree to which society and governments are able to alter the course of global warming, our challenge in the short term is to understand the effects of climate change on the Arctic, anticipate the impact on Arctic species, and support the adaptation of those species and their dependent human communities to the fullest extent possible. In addition, the application of ecosystem-based management of expanding industrial activities in the Arctic is necessary if we are to protect Arctic ecosystems, species, and human communities while taking advantage of economic opportunities there.

Oil and Gas Development

The Arctic is an area of intense global interest for oil and gas development. At the same time offshore oil and gas activities in the Arctic present unique risks to marine mammals and to the indigenous communities who depend on them for cultural and nutritional subsistence. Perhaps the greatest risk to marine mammals and the marine environment is from oil spills. The *Deepwater Horizon* oil spill highlighted the difficulties in responding to and cleaning up a major oil spill—difficulties that are heightened by the Arctic's remoteness, harsh conditions, presence of sea ice, and lack of infrastructure, trained personnel, and equipment to respond to an oil spill emergency. Other impacts arise from the sounds generated by seismic surveys and drilling operations, possible chemical contamination and alteration of key habitats, and disturbance from vessel and aircraft support activities.

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 Arctic areas adjacent to Prudhoe Bay. Offshore oil and gas development in the Arctic began in the Beaufort Sea with the first lease sale in 1979. Oil companies drilled 35 exploratory and test wells in the Chukchi and Beaufort Seas between 1981 and 2002 (Figure II-9).[9] Many of the wells were either dry or deemed not commercially productive. One exception is the Northstar oil pool in the Beaufort Sea, which was discovered in 1984 and went into production in 2001.

In the 2007–2012 five-year leasing program, the Bush Administration scheduled six lease sales in the U.S. Arctic—two in the Beaufort Sea, three in the Chukchi Sea, and one in the North Aleutian Basin. The Minerals Management Service conducted only one Arctic lease sale during that period, lease sale 193 in the Chukchi Sea, in February 2008. Interest in the Chukchi Sea lease sale was greater than anticipated, drawing record offers on 487 leases and collecting bids worth about $2.7 billion on more than

9 http://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Historical-Data/Index.aspx

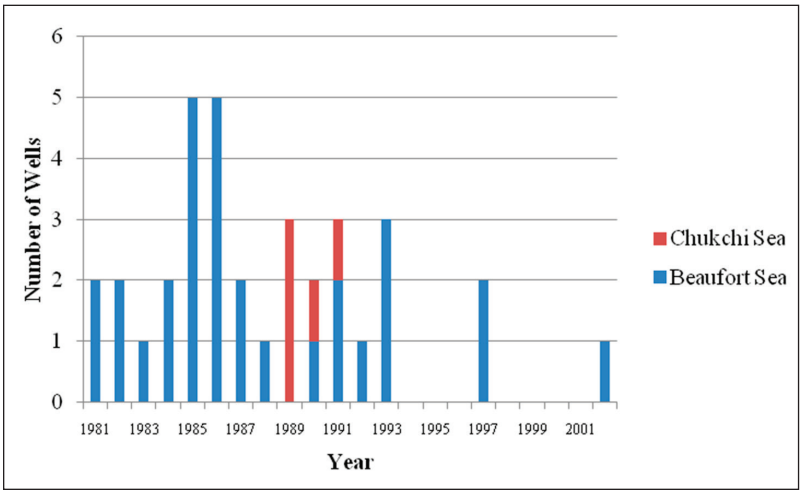

Figure II-9. Exploratory wells drilled in Arctic outer continental shelf waters prior to 2012, by planning area and year. (Source: BOEM)

2.7 million acres. The lease sale was fueled by estimates of significant reserves in offshore waters of the U.S. Arctic and an increased price of oil (MMS 2006, DOE 2007).

An updated estimate from 2011 of undiscovered, technically recoverable resources of oil and gas in the Arctic continues to underscore the significance of the U.S. Arctic for potential oil and gas development, with an estimated 29 percent of the total U.S. offshore oil and gas resources contained in Arctic planning areas (i.e., areas north of the Aleutian islands) (BOEM 2012). The largest shares of those resources are in the Chukchi (18 percent) and Beaufort (8 percent) planning areas. Figure II-10 shows a map of the Chukchi and Beaufort Sea planning areas and currently held leases in each area.

Exploration activities in the Chukchi and Beaufort Sea two years before and since the 2008 lease sale have included seismic surveys, shallow hazards site surveys, and in 2012 limited exploratory drilling. Shell had planned to drill three exploratory wells in the Chukchi Sea and two in the Beaufort Sea in 2010 (Shell 2010a, Shell 2010b). However, concerns raised after the *Deepwater Horizon* oil spill regarding the ability to prevent and contain a well blowout led to heightened scrutiny of Shell's planned safety measures and oil spill prevention and response plans for Arctic drilling. Those concerns, along with ongoing litigation over lease sale 193, uncertainties regarding whether Shell could obtain the necessary federal permits,[10] and ultimately the Department of the Interior's temporary suspension of offshore drilling caused Shell to delay its drilling activities until 2012.

At its 2012 annual meeting in Anchorage, Alaska, in January, the Commission considered the potential impact of oil and gas exploratory drilling on Arctic marine mammals and on the availability of marine mammals for subsistence. Presenters summarized the potential impact of drilling on marine mammals, including disturbance, displacement, and possible injury from drilling activities, vessel strikes, exposure to drilling muds and other contaminants, and habitat alteration. Recommendations were made on the need for better information on the long-term and cumulative effects of exposure to sound and other drilling activities, on whether bowhead whales and other marine mammals are showing signs of habituation to sound and other activities, and whether animals are altering their migration routes and foraging patterns to avoid exposure to sound. Also noted was the incorporation of traditional ecological knowledge into agency decision-making processes.

In their presentations at the meeting, Native Alaska hunters noted the extreme sensitivity of marine mammals, especially bowhead and beluga whales, to sound and vessel activities, and how sound in the Arctic marine environment had been increasing over the last 30 years. They expressed concern that increased sound levels could cause marine mammals to abandon traditional hunting areas and that whales and seals may become contaminated by swimming through waters containing drilling muds or spilled oil. They had little confidence that current oil spill response techniques would be effective at removing spilled oil from the marine environment before animals became exposed.

Whalers in Barrow and other Alaska communities have entered into conflict avoidance agreements with oil and gas companies and seismic operators to

10 http://www.nytimes.com/gwire/2011/02/03/03greenwire-shell-cancels-2011-arctic-drilling-plans-18881.html

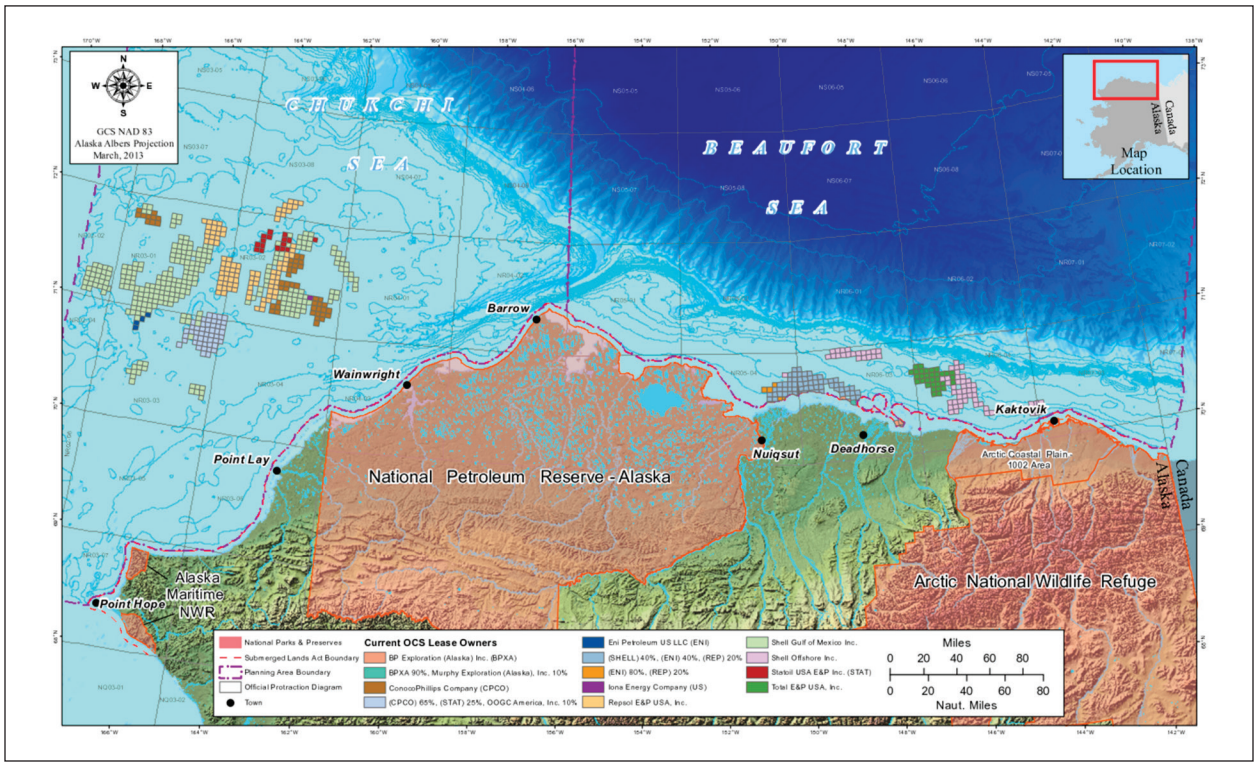

Figure II-10. Lease ownership in the Outer Continental Shelf planning areas of the Chukchi and Beaufort Seas. (Source: BOEM)

minimize disturbance of the spring and fall bowhead whale subsistence hunts. The agreements, negotiated and revised annually, specify areas and times that industry must not operate so as to avoid disturbing marine mammals before a hunt. The agreements also require the use of village-based communication centers to relay information between hunters and industry regarding planned operations and marine mammal presence and movements. At the Commission's annual meeting the hunters recommended that those agreements be expanded to include other species in addition to bowhead whales and also to address other potentially harmful activities, such as shipping and fishing.

Current response technologies and the infrastructure for responding to an oil spill are generally considered inadequate for any large spill or blowout that might occur in the Arctic, especially in icy conditions. In the aftermath of the *Deepwater Horizon* oil spill, significant commitments were made to begin to address this inadequacy. Congress increased funding for the Bureau of Safety and Environmental Enforcement (BSEE) in 2012 to conduct oil spill response research, and BSEE indicated it would use a portion of that funding to further investigate response equipment and methods, such as the effectiveness of dispersants in ice, in situ burning in ice conditions, and remote sensing of oil in and under ice. BSEE also planned to develop stronger analytical capabilities to model spill trajectories and worst case discharge scenarios and to conduct training and oil spill drills. In July 2011 President Obama mandated the establishment of an interagency working group on the Coordination of Domestic Energy Development and Permitting in Alaska (E.O. 13580[11]), with the goal of facilitating better interagency communication on energy development activities and broader participation by other federal agencies in the review of oil spill response plans.

The majority of resources and trained personnel for oil spill response in the Arctic are located in the Beaufort Sea, near Prudhoe Bay. Alaska Clean Seas, a cooperative supported by most of the oil companies

11 http://www.whitehouse.gov/the-press-office/2011/07/12/executive-order-13580-interagency-working-group-coordination-domestic-en

operating on the North Slope, provides oil spill response and training capabilities for Arctic oil and gas operations. In preparation for its 2012 drilling program Shell representatives stated that prevention of an oil spill was its first priority. At the same time, the company was putting in place preparations to respond to the eventuality of a spill by testing and enhancing its blowout preventer technology, developing an Arctic-specific capping and containment system, ensuring that full response and recovery capabilities are located on site in both the Beaufort and Chukchi Seas, and preparing a second rig to be ready for drilling relief wells as necessary.

The responsibility to respond to potential impacts on Arctic marine mammals in the event of a spill falls primarily to the federal and state resource agencies—the U.S. Fish and Wildlife Service for polar bear and walrus and the National Marine Fisheries Service for all other marine mammals. The Alaska Department of Fish and Game is mandated to manage and protect all wildlife resources and has joint statutory responsibilities with the two federal Services. Each agency has predetermined roles and responsibilities in the event of an oil spill, as outlined in the Wildlife Protection Guidelines of the Alaska Federal/State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases, or "Unified Plan" (Alaska Regional Response Team 2012).

There are three levels of wildlife-protection response strategies identified in the Unified Plan: primary, secondary, and tertiary. Primary response involves preventing oil from contaminating animals and their habitats; this may include skimming, booming, in situ burning, and/or the use of dispersants, as well as the removal of oiled debris and food sources (including oiled carcasses). Secondary response involves preventing animals from entering oiled areas through the use of deterrent methods, such as hazing or boat-based herding, or through pre-emptive capture and release into unaffected areas. Tertiary response, considered only as a last resort, involves capture, treatment, rehabilitation, and release of oiled animals. Secondary and tertiary response methods would require specific authorization (preferably pre-authorization) under the Marine Mammal Protection Act (and the Endangered Species Act for listed species), training of designated responders, specialized care by veterinarians, and appropriately equipped rehabilitation facilities. The agencies will need to work with marine mammal co-management organizations to develop priorities and protocols for rehabilitation and potential release of oiled animals. In response to the *Exxon Valdez* oil spill, and in keeping with the ongoing and increasing concern over the potential effects of oil spills on marine mammals, both the Fish and Wildlife Service and the National Marine Fisheries Service have developed marine mammal-specific oil spill response guidelines and have conducted training, workshops, and drills for designated marine mammal stranding response organizations, veterinarians, and others. The Fish and Wildlife Service has species-specific oil spill response plans[12] in place that provide information on the species' population(s), distribution, life history, susceptibility to oil spills, responder training needs, response strategies, and key contacts. The National Marine Fisheries Service's oil spill response guidelines are applicable to all marine mammal species (including those under the jurisdiction of the Fish and Wildlife Service) and provide information on communication with other responders and the public, documentation of injuries (including sample data collection forms), capture, transportation, care, and rehabilitation of oiled animals, and making informed decisions for appropriate response during an oil spill event (Johnson and Ziccardi 2006). Despite these plans, there is considerable preparation needed for marine mammal response in the Arctic because of limited capacity and infrastructure.

The recent experience of the *Deepwater Horizon* oil spill identified key questions that are relevant to oil spill response planning for the Arctic—some of which remain unanswered. For example, environmental and sea ice conditions and the distribution of marine mammals at the time of a spill will influence decisions regarding appropriate response strategies, with potential trade-offs for different species. It is essential to identify who will make those decisions and how ensuing conflicts will be minimized.

Food safety and the loss of subsistence resources will be a major concern for North Slope communi-

12 http://www.fws.gov/contaminants/FWS_OSCP_05/FWSContingencyTOC.htm#L

ties, especially if a spill extends beyond a localized area. Critical questions include:

- Who will determine whether subsistence resources have been contaminated?
- How will that information be communicated to communities at risk?
- What authorities exist for limiting subsistence activities?
- How will lost hunting opportunities be addressed?
- Will euthanasia be necessary to prevent future harvest of animals perceived to be contaminated?

Primary oil spill response strategies (i.e., booming, skimming, in situ burning) were largely ineffective at preventing exposure of sensitive species and habitats in the Gulf of Mexico and are likely to fail also in the Arctic in the event of a large or uncontained spill. Critical questions include:

- Will investments continue to be made in oil spill response research to improve primary response measures?
- Are secondary response measures feasible, such as deterrence of animals away from oiled areas, and who would be authorized and trained to conduct such activities?
- What capabilities and facilities exist on the North Slope for tertiary response measures, such as treatment and rehabilitation of oiled animals?
- Will rehabilitated animals ever be deemed releasable, in part due to food safety concerns, or will they be relegated to remain in permanent captivity?

As development of offshore oil and gas resources moves forward in the Arctic, impacts from routine activities as well as small spills or rare catastrophic events must be anticipated and efforts made to prevent such events and to minimize harm to marine mammals and the marine environment from such activities and events. Such efforts will require:

- a continued focus on collection of baseline data for predicting and mitigating potential impacts and for damage assessment,
- comprehensive environmental monitoring at all stages of oil and gas development
- effective mitigation to minimize harm from sound exposure and other development-related activities
- the implementation of strong safety measures to prevent blowouts and other accidents that may lead to an oil spill
- infrastructure (e.g., communication, transportation, housing, etc.) necessary to respond to an oil spill
- effective oil spill cleanup and response strategies
- international cooperation on oil spill prevention, preparedness, and response (e.g., Arctic Council Working Group on Emergency Prevention, Preparedness, and Response negotiations on Oil Spill Preparedness and Response, EPPR 2012) (and see section on Arctic Shipping), and
- wildlife response plans that are comprehensive yet realistic, and which take into account the considerable knowledge and legitimate concerns of Native Alaska communities that depend on marine mammals for their survival.

Arctic Shipping

In its 2009 annual report the Commission summarized the Arctic Marine Shipping Assessment (AMSA) conducted by the Arctic Council's Protection of the Arctic Marine Environment (PAME) working group (Arctic Council 2009). The AMSA considered the 20-year future of Arctic navigation in the face of declining seasonal sea ice and addressed indigenous marine use, marine incidents, environmental impacts, marine infrastructure, marine technology, and the future of the Northern Sea Route[13] and Northwest Passage.[14] The Commission's 2009 report reviewed AMSA's conclusions on the environmental risks posed by shipping to marine mammals, the marine environment, and communities.

Historically, shipping has posed little risk to Arctic marine mammals. However, the risks are expected to increase with the increase in shipping in the Arctic. Chief among the risks from commercial

13 The Northern Sea Route is defined in Russian Federation law as a set of marine routes from Kara Gate (South of Novaya Zemlya) in the west to the Bering Strait in the east. Several of the routes are along the coast, making use of the main straits through the islands of the Russian Arctic; other potential routes run north of the island groups (Arctic Council 2009).

14 The Northwest Passage is the name given to various marine routes between the Atlantic and Pacific oceans along the northern coast of North America that span the Canadian Arctic Archipelago (Arctic Council 2009)

shipping and tourism are ship strikes, the accidental release or illegal discharge of oil, and the degradation of the migratory, foraging, and reproductive habitat of marine mammals. Vessel noise is known to affect the behavior of some marine mammals and chronic noise from ships has been described as acoustic smog capable of masking signals important to marine mammals (Clark et al. 2009). In addition, the assessment concluded that such effects, either individually or cumulatively, may impair the culturally and nutritionally significant subsistence harvesting of marine mammals by Alaska Natives.

Potential management measures pertaining to Arctic shipping generally fall into three categories: (1) routing ships to avoid sensitive habitats and establishing navigational aids, charts, and other guides such as icebreaker accompaniment; (2) establishing standards for design and operation of ships in Arctic waters to prevent accidents and environmental impacts; and (3) contingency planning for response to oil spills and other emergencies. Such measures are largely the responsibility of the U.S. Coast Guard (USCG) in U.S. waters and the International Maritime Organization (IMO) in international waters. The USCG serves as the lead agency for the United States at all meetings of the IMO.

The risks to marine mammals from increased shipping may be especially heightened in areas where traffic is, or will be, concentrated, such as the Bering Strait and Unimak Pass. As detailed below for the Bering Strait, these passes and straits are also important bottlenecks in the migratory routes of marine mammals. Since publication of the AMSA in 2009, Arctic shipping has increased significantly. By one measure, the number of commercial cargo ship transits between the Atlantic and Pacific Oceans on the Northern Sea Route increased from 4 in 2010, to 34 in 2011, to 46 in 2012 (ARCTIS 2012, Pettersen 2012). The amount of cargo carried also increased more than tenfold from 110,000 tons reported in 2010, to 820,789 tons in 2011, to 1,261,545 tons in 2012 (Pettersen 2012). Petroleum products (894,079 tons of diesel fuel, gas condensate, jet fuel, LNG and other products) made up the largest portion (70.9 percent) of the cargo in 2012, followed by iron ore and coal (26.5 percent; Pettersen 2012). Up-to-date data on the volume of destinational shipping into Arctic ports since the 2004 AMSA survey are hard to find. The Alaska Marine Exchange reported a 22 percent increase in transits of the Bering Strait alone, from 277 in 2009 to 338 in 2010, and noted that tanker traffic more than doubled during those two years.[15] As one example of such shipping, the fleet of vessels associated with Royal Dutch Shell's summer 2012 exploratory drilling activities in the Chukchi and Beaufort Seas included Shell's two floating rigs, the *Noble Discoverer* and the *Kulluk*, and about 20 additional vessels, including icebreakers, supply vessels, tankers, tugs, and specialized oil spill response boats (NMFS 2012). Further to the south, but still within the area defined as the Arctic basin by the AMSA (Arctic Council 2009), there were an estimated 3,115 passages through Unimak Pass in the Aleutian Islands between October 2005 and September 2006 by cargo ships following the great circle route across the Pacific between Asian and North American ports (Nuka Research and Planning Group 2006).

As reported in the Commission's 2010–2011 annual report, the Arctic Council agreed to a number of international follow-up actions to implement the AMSA recommendations. Negotiations on Arctic marine pollution preparedness and response in the Working Group on Emergency Prevention, Preparedness and Response were initiated in 2011 and continued in 2012, with the goal of producing a legally binding agreement to be signed at the 2013 Arctic Council Ministerial. The AMSA also recommended the development of an IMO polar code from current voluntary guidelines for ships navigating in the Arctic. At the heart of such a code would be standards for polar ships relative to their degree of ice-strengthening, ice-navigation competency requirements for those piloting ships in the Arctic, and marine safety equipment tailored for ships operating in the Arctic (Brigham 2011). The IMO decided to work toward a mandatory polar code in 2009 with the goal of a 2012/2013 completion, but at the end of 2012 it appeared this would not be completed until 2014 or later.

As noted above, transits through the Northern Sea Route have increased tenfold in the past three

15 http://www.regulations.gov/contentStreamer?objectId=0900006480dff840&disposition=attachment&contentType=msw12

years. Russia put in place a new Northern Sea Route Administration and new regulations to manage Northern Sea Route shipping in 2011, but there are concerns that these measures will not adequately address environmental challenges in this remote and vulnerable area, especially that of managing response to a major oil spill and paying for the large environmental damage likely to ensue from such an event (Staalesen 2012). Commercial transits through the Northwest Passage have been far fewer than through the Northern Sea Route; most transits have been by icebreakers (of several countries) on coast guard or research duties, passenger ships offering Arctic tourism opportunities, and tug and supply vessels, some with barges (Northwest Territories 2012). As discussed above, there is considerable vessel activity in the Bering, Chukchi, and Beaufort Seas to the west of the Northwest Passage and destinational traffic and extensive cruise-ship tourism in the eastern Arctic—Canada and Greenland. While the risk of environmental damage from oil spills and other contaminants from maritime accidents in northern Canada and along the Northwest Passage is a major concern, the difficulty of search and rescue operations and the possibility of loss of life from incidents involving large passenger vessels operating in those waters are larger concerns, according to shipping authorities (Arctic Council 2009, Transport Canada 2005).

Bering Strait Port Access Route Study

Perhaps the most significant U.S. management effort underway with regard to Arctic shipping in 2012 was the Port Access Route Study (PARS) for the Bering Strait, which was being conducted by the Coast Guard to consider the establishment of vessel traffic lanes on the U.S. side of the strait and related management actions to address the expected increase in shipping through the strait (75 Fed. Reg. 68568). The study, initiated in 2011, was designed to assess whether vessel routing measures would make vessel movements more predictable and decrease the potential risk of vessel collisions, oil spills, and other events that could threaten the marine environment.

The Marine Mammal Commission commented on the PARS study in a letter of 6 May 2011 and the recommendations were reported in Appendix A of the 2010–2011 annual report. Since the Coast Guard had not concluded this study by the end of 2012, those recommendations are reiterated here (see text box on facing page). As described in the Commission's letter, the Bering Strait is a roughly 50-mile-wide gateway between the Seward Peninsula, Alaska, and the Chukotka Peninsula, Russia. A recent report concluded that the strait meets all seven of the Convention on Biological Diversity's criteria for ecologically and biologically significant areas (Speer and Loughlin 2010). Among other things, large numbers of marine mammals migrate seasonally through the strait between feeding and wintering grounds in the Chukchi and Bering Seas, respectively. Between early March and May, bowhead whales migrate north from wintering grounds in the Bering Sea though the Bering Strait to feeding grounds in the Beaufort and Chukchi Seas, possibly following a route that takes most whales through U.S. waters along the eastern side of the strait. After moving to waters in the western Chukchi Sea north of the Chukotka Peninsula between late summer and fall, most bowhead whales return south in November and December, traveling principally through Russian waters along the western side of the strait to wintering grounds in the Bering Sea (Braham et al. 1980, Moore et al. 1995, Quakenbush et al. 2010a, b). Less is known about the movement of gray whales through the Bering Strait; however, observations of feeding whales in the Chukchi Sea and the Bering Strait between August and November, and occasionally as late as early December, indicate that a portion of the population feeds in the area, with migratory timing likely influenced by ice conditions (Berzin, 1984, Clarke and Moore 2002, Moore et al. 2003). In addition, gray whales feed immediately south of the Bering Strait and along the Chukotka coast during summer and fall months (Moore et al. 2000, 2003, Heide-Jorgenson et al. 2012). A large portion of the Pacific walrus population migrates annually through the strait. The northward migration peaks in May and June and the southward migration peaks in October and November as pack ice forms and pushes south (Garlich-Miller et al. 2011). In late fall, walruses form large aggregations along the Russian coast on the northwestern side of the Bering Strait. Large numbers of walruses also have been reported hauled out intermittently on

Marine Mammal Commission recommendations, 6 May 2011, to the U.S. Coast Guard on its planned port access route study for the Bering Strait.[17]

The Marine Mammal Commission recommends that the U.S. Coast Guard:

- 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—particularly endangered or threatened marine mammals—and ships while also meeting requirements for vessel safety and other environmental, cultural, and subsistence protection needs;
- consult with the National Marine Fisheries Service and the 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 mammal species listed or under consideration for listing under that Act from possible impacts associated with vessel traffic and alternative vessel traffic management options;
- consult with 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;
- provide a thorough analysis of 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;
- consult with 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 to 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;
- 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; and
- consult with 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.

islands in the Bering Strait region (Big Diomede, King Island, and the Punuk Islands) in late fall and early winter, prior to the onset of ice formation (Fay 1982). Substantial portions of several seal populations (particularly the various species of ice seals) and small cetaceans (particularly beluga whales) also move through the strait seasonally. All of these species are vital cultural and subsistence resources for indigenous residents in both Alaska and Chukotka. In response to the PARS study and concerns over the possible impact of shipping on wildlife and subsistence, Alaska Native Groups and non-governmental organizations sponsored workshops on shipping and marine mammals (WCS 2012) and the Coast Guard received public comments from 33 entities.[16]

In addition to its recommendations to the Coast Guard, the Commission echoed the AMSA findings

16 http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;dct=PS;D=USCG-2010-0833

17 http://mmc.gov/letters/pdf/2011/cgd_BS_PARS_050611.pdf

in noting that "vessel traffic and management through the Strait could have significant effects on marine mammals and those effects should be considered as part the Coast Guard's study. In general, ship traffic poses at least three significant threats to marine mammals: (1) collisions with ships can kill or seriously injure marine mammals (especially large whales); (2) ship collisions and vessel groundings can release potentially large quantities of contaminants, such as fuel oil or hazardous cargo, into the marine environment, affecting marine mammals either directly through physical contact or indirectly through contamination of their food; and (3) disturbance due to noise from engines, ice-breaking activities, or other vessel noise or the mere physical presence of the vessels can alter marine mammal movements and habitat-use patterns."

Commercial Fishing

There are no commercial fisheries operating currently within the federal portion of the U.S. Exclusive Economic Zone (EEZ) (beyond 3 nm from land) north of the Arctic Circle (U.S. Arctic, hereafter),[18] although some operate in state waters. However, subsistence harvesting of fish occurs in the U.S. Arctic primarily in coastal waters.[19]

During the late 2000s the North Pacific Fishery Management Council and the National Marine Fisheries Service, with input from the fishing industry and other stakeholders, considered the potential for fisheries in the U.S. Arctic and options for managing exploitation there. In 2009, with strong industry and stakeholder support, the Council unanimously recommended, and the Service adopted, the policy that commercial fishing should be prohibited "until sufficient information is available to support the sustainable management of a commercial fishery." The adoption of this precautionary approach to the exploitation and management of largely untapped resources was seen as an important, unprecedented step in U.S. fishery management policy. The Council has pledged that, as knowledge develops and climate change progresses, it will adopt measures intended to "prevent unregulated fishing, apply the Council's precautionary, adaptive management policy through community-based or rights-based management, apply ecosystem-based management principles that protect managed species from overfishing and protect the health of the entire marine ecosystem, and where appropriate and practicable, include habitat protection and bycatch constraints" (NMFS 2009b).

Zeller et al. (2011) compiled records of commercial and subsistence fish catches in the Arctic. According to an earlier report (Booth and Zeller 2008), the only U.S. commercial fishing they documented was for chum salmon (*Oncorhynchus keta*) in Kotzebue Sound[20] and for whitefish (coregonid) in the Colville River Delta.[21] Both fisheries are in state waters. The chum salmon fishery in Kotzebue Sound began in the early 1960s and the Colville River whitefish fishery (principally for Arctic cisco, *Coregonus autumnalis*, and broad whitefish, *C. nasus*) was operational in the early 1960s, and began perhaps as early as 1950. Total commercial catches from these two fisheries combined varied between roughly 250 and 550 tons a year (t/yr) in the 1950s and 1960s. During this period estimated subsistence catches of these same species in the U.S. Arctic were two or three times greater (850 t/yr) than the commercial catches. Beginning in the mid-1970s the chum salmon fishery showed wide fluctuations in catch levels presumably due to inter-annual variation in the size of salmon runs. Average commercial catches in the 1970s and 1980s were roughly 1,100 t/yr and 1,400 t/yr, respectively. Estimated subsistence catches were somewhat lower during this period than they had been in the 1950s and 1960s (roughly 700 to 800 t/yr). Despite continuing large fluctuations, average commercial catches declined after 1982 to

18 A common geographic definition of the Arctic is the area north of the Arctic Circle (63 degrees 30 minutes north latitude). In Alaska that corresponds to those portions of the Chukchi and Beaufort Seas east of Russian waters and west of Canadian waters, or the U.S. EEZ north of the Bering Strait. Other definitions based on temperature or ice extent include part or all of the Bering Sea. For our purposes here we will restrict consideration of the Arctic to the U.S. EEZ off Alaska's northern coast, from the Bering Strait at the Arctic Circle in the west to the Canadian border, a region known as the Arctic Management Area (2009b).

19 Subsistence fishing is managed by the State and Federal governments depending on where the activity occurs, who manages the fishery, and whether there are agreements governing the particular fishery.

20 Kotzebue Sound is in the southern Chukchi Sea just north of the Bering Strait.

21 The Colville Delta is on the Arctic coast just west of Prudhoe Bay.

just 226 t/yr in the early to mid-2000s. In contrast, subsistence catches rose during the late 1980s and appear to have stabilized near 1,000 t/yr since that time. In addition, Japan briefly operated a salmon fishery in the Chukchi Sea inside the U.S. EEZ in 1966 and 1967.

The federal government has identified four other small, poorly documented commercial fisheries in Kotzebue Sound: (1) a herring sac roe fishery prior to 1996, (2) possibly a crab fishery in recent years, (3) a sheefish (*Stenodus nelma*) fishery in Hotham Inlet, and (4) a red/blue king crab (*Paralithodes camtschaticus*/*platypus*) fishery in the outer sound (NMFS 2009a).

Commercial fisheries elsewhere in the Arctic, principally Canada and Russia, have been larger and more important than in the U.S. Arctic (Zeller et al. 2011). Canadian Arctic fisheries in the Beaufort Sea, Arctic Archipelago, and Hudson Bay have been described in several publications (see references in Zeller et al. 2011). As in the U.S. Arctic, commercial fisheries began in the 1950s, but many more small-scale, community-based commercial fisheries operate in Canada and Russia than in the United States. Most of these fisheries have targeted Dolly Varden (*Salvelinus malma*) and various species of whitefish. In Russia, whitefish, Siberian sturgeon (*Acipenser baeri*), pink salmon (*Oncorhynchus gorbuscha*), Dolly Varden, and smelt (*Osmerus mordax*) fisheries have been documented in the Kara, Laptev, and East Siberian Seas. In total, Zeller et al. (2011) estimated commercial and subsistence catches in Canada and Russia to have declined from 20,000 to 25,000 t/yr in the 1950s to 10,000 to 15,000 t/yr in the 2000s.

Vilhjalmsson et al. (2004) identified significant fisheries in the Barents, Norwegian, and Labrador Seas, and around Greenland and Iceland. These fisheries targeted numerous species, including polar (Arctic) cod (*Boreogadus saida*), Greenland halibut (*Reinhardtius hippoglossoides*), northern shrimp (*Pandalus borealis*), capelin (*Mallotus villosus*), Atlantic herring (*Clupea harengus*), Atlantic cod (*Gadus morhua*), redfish (*Sebastes marinus* and *S. mentella*), and snow crab (*Chionoecetes opilio*). Some of these areas are truly Arctic species, while others are influenced by the temperate waters of the North Atlantic. Some of these fisheries are orders of magnitude larger than those in the Pacific Arctic sector. Hunt and Megrey (2005) summarized catches in the Barents Sea; from 1998 to 2002 average annual catches, totaled for the top five species—Atlantic cod, Atlantic herring, capelin, haddock (*Melanogrammus aeglefinus*), and northern shrimp—were roughly 811,000 tons. For comparison, catches of pollock (*Theragra chalcogramma*), Pacific cod (*Gadus macrocephalus*), yellowfin sole (*Limanda aspera*), Atka mackerel (*Pleurogrammus monopterygius*), and rock sole (*Pleuronectes bilineatus*) in the Bering Sea averaged approximately 1,542,000 tons during the same period.

Although current commercial catches in the U.S. Arctic are small compared to those of the Barents and Bering Seas, recent explorations have identified the potential for somewhat larger fisheries than currently exist there. Surveys of the biota of the Chukchi and Beaufort Seas have been conducted since the 1950s (see references in NMFS 2009a). Although no single survey or series of surveys has provided a comprehensive view of the species present and their abundance and potential for exploitation, several studies have provided important clues to the species present (Table II-1).

Arctic cod is the species often identified as being the most abundant, but other species of note are saffron cod, several flounders (Arctic, Bering, yellowfin, and starry, and Alaska plaice), snow crab, herring, smelt, and capelin, and several species of sculpin. Species commercially exploited elsewhere in the Arctic or sub-Arctic (e.g., Arctic cod, pink and chum salmon, Dolly Varden, snow crab, shrimp, clams, scallops, yellowfin sole, starry flounder, Alaska plaice, longhead dab, halibut, and herring) have been found in the Chukchi and/or Beaufort Seas. Most surveys have found insufficient quantities or sizes to warrant the development of a commercial fishery (e.g., Alverson and Wilimovsky 1966, Fair and Nelson 1999). However, most surveys have not estimated total biomass, catch per unit effort, or possible sustainable yields. Frost and Lowry (1983) estimated the biomass of Arctic cod in the Chukchi and Beaufort Seas to be 86,000 mt. In contrast, the biomass of most exploited species in the Bering Sea and around Aleutian Islands are several times to orders of magnitude larger (Groundfish Plan Team 2012).

Table II-1. Summary of fish surveys in the Beaufort and Chukchi Seas (abstracted from NMFS 2009a; references can be found therein)

Study	Study Location	Type of Survey	Most Abundant Species
Alverson and Wilimovsky 1966	Eastern Chukchi		Arctic cod, herring, Bering flounder, saffron cod, capelin, rainbow smelt, sculpins
NMFS 1976	Eastern Chukchi	Pelagic and demersal collections	Arctic cod, Alaska plaice, saffron cod, smelt, herring, yellowfin sole, starry flounder, snow crab
Frost and Lowry 1983	Chukchi and Beaufort Seas	Demersal – otter trawl	Arctic cod, Canadian eelpout, two-horn sculpin, scallops, snow and Arctic lyre crabs
Fechhelm et al. 1985	Northeastern Chukchi Sea	Nearshore: fyke and gill nets; Offshore: trawl and gill nets	Winter: Arctic cod; Summer, nearshore: Arctic cod (39%), capelin (25%), four-horn sculpin (20%), Arctic flounder (13%); Summer, offshore: Arctic cod (54%), Arctic staghorn sculpin (24%), shorthorn sculpin (7%), saffron cod (6%)
Jarvela and Thorstein 1999	Central Beaufort, nearshore waters	Purse seine and surface tow net	Arctic cod, capelin, liparids
Fair and Nelson 1999	Chukchi Sea	Review of some surveys	Arctic cod, Arctic staghorn sculpin, Bering flounder
Barber et al. 1994		NMFS surveys 1989–1992	Arctic cod, saffron cod, warty sculpin, snow crab
Barber et al. 1997	Southeastern Chukchi Sea	Demersal	Arctic and saffron cod (82%)
Bering Sea Fishermen's Association (reported in Fair and Nelson 1999)	Chukchi Sea and Kotzebue Sound	Trawl	Saffron cod, Arctic staghorn sculpin, yellowfin sole, warty sculpin, Arctic cod
Hopcroft et al. 2007	Prudhoe Bay region	Synthesis of decades of oil industry surveys	Coastal species: Arctic cisco, least cisco, broad whitefish, Dolly varden. Marine species: Arctic cod, fourhorn sculpin, Arctic flounder
Logerwell et al. 2010	Beaufort Sea	Bottom and acoustic trawl	CPUE (kg/ha): snow crab (50), Arctic cod (24), eelpouts (3.8), Bering flounder (0.74), walleye pollock (0.70), Greenland turbot (0.23), Pacific cod (0.02)

Logerwell et al. (2010) provided some comparisons of estimated catch-per-unit-effort (CPUE) among the Chukchi, Beaufort, and Bering Seas (Table II-2). Species that are commercially important in the Bering Sea, such as Pacific cod, walleye pollock, and snow crab, have much greater CPUEs in the Bering Sea than in the Arctic seas. Although pollock observed in the Arctic were below commercial size, a few snow crabs of a harvestable size were encountered for the first time by Logerwell et al. (2010).

Arctic cod, which often associates with sea ice, is an important prey species for marine birds and mammals and may be the most important secondary producer in the ecosystem (Bradstreet and Cross 1982, Frost and Lowry 1984, Welch et al. 1992, Bluhm and Gradinger 2008). Bluhm and Gradinger (2008), summarizing a large number of studies of Arctic marine mammal diets, identified the trophic relationships of marine mammals and different species/groups of fish and invertebrates (Table II-3).

The National Marine Fisheries Service and the North Pacific Fishery Management Council have evaluated the potential for commercial fisheries to develop in the U.S. Arctic for a number of stocks

Table II-2. Comparisons of CPUE (kg/ha) of exploited species in the Beaufort, Chukchi, and Bering Seas (abstracted from Table 11 in Logerwell et al. 2010)

Species	Beaufort Sea 2008[1]	Chukchi Sea 1990[2]	Bering Sea 2008[3]
Arctic cod	6.1	3.0	1.0
Bering flounder	0.11	0.18	0.45
Greenland turbot		<0.01	0.27
Pacific cod		0.12	8.65
Saffron cod		0.39	<0.01
Walleye pollock	0.13	0.02	61
Snow crab	0.47	6.73	72

1 Logerwell et al. 2008, 2010
2 Barber et al. 1997
3 Eastern Bering Sea 2008 survey (NMFS)

that are exploited elsewhere and found that, with the exception of Arctic cod, saffron cod, and snow crab, there is little potential for targeted fisheries to develop in the area (Table II-4; NMFS 2009a, b).

While data available to date indicate little potential for the development of commercial fisheries in the U.S. Arctic, ocean warming due to climate change, and the indirect effects resulting from that warming, may improve this potential in the future. Generally, as Arctic seas warm in response to climate change, projected catch potential for many species is expected to increase significantly at high latitudes, especially in the Arctic and sub-Arctic (Cheung et al. 2010), although the manner in which this unfolds will depend on a variety of physical and biological factors (Walther 2010, Cheung et al. 2011). Based on a survey of experts, Hollowed et al. (2013) identified stocks with low, medium, and high potential to move to or expand their range in the high Arctic. Of 17 species assessed, Greenland halibut, yellowfin sole, Alaska plaice, Bering flounder, and snow crab were judged to have a moderate to high potential to move to or expand in the Chukchi and/or Beaufort Seas (Hollowed et al. 2013). Experts are predicting that the shallow depths in the Bering Strait and the projected persistence of the "demersal cold-water pool" (Stabeno et al. 2012) in the northern Bering Sea will restrict the expansion of several commercially important species (e.g., Pacific Ocean perch, Pacific cod, and walleye pollock) from the Bering into the Chukchi Sea. No plans are currently in place for the development of commercial fisheries in the U.S. Arctic.

Some coastal communities are interested in participating in commercial fisheries, should they develop, but also are concerned about the potential impact on subsistence fisheries and habitats important to other species they depend on. The Arctic Ocean and its marginal seas contain some of the marine ecosystems least affected so far by human activities and exploitation. The low temperatures and lack of sunlight much of the year mean that fish and invertebrates living in the Arctic generally are slow growing, have delayed maturity, reproduce slowly, and have long life spans, making them slow to recover from impacts such as excessive fishing pressure. Because of the inherent vulnerability of Arctic fish and invertebrates, and because marine

Table II-3. Arctic marine mammals and their primary prey (abstracted from Table 1 in Bluhm and Gradinger 2008)

Species	Beluga Whale	Narwhal	Walrus	Bearded Seal	Ringed Seal	Spotted Seal
Arctic cod	✓	✓			✓	✓
Polar cod	✓					
Saffron cod	✓				✓	✓
Greenland halibut		✓				
eelpouts				✓		
whitefish	✓					
capelin	✓			✓		
herring					✓	
smelt					✓	
sandlance	✓					
squid		✓				
bivalves			✓	✓		
shrimps	✓				✓	
crabs				✓		

Table II-4. Likelihood that commercial fisheries for exploited species could develop in the Chukchi and Beaufort Seas (abstracted from NMFS 2009a, b).

Species / Stock	Conclusions
Bering flounder	Unlikely because not targeted in the Bering Sea and of small size in the Chukchi Sea
Arctic cod	Widespread and often most abundant species in the Arctic but uncertain if occurs in commercially exploitable quantities
Alaska plaice	Not likely because little commercial interest and lack of targeting in the Bering Sea and low abundance in the Arctic, although it does have the potential to expand there as climate change proceeds
Starry flounder	Unlikely that a directed fishery would develop because of the low densities in the Arctic and low market value of the species
Blue and red king crab	Unlikely because of their importance as subsistence harvest and the low abundance and sub-legal size of individuals in the Chukchi Sea
Snow crab	Some possibility given the presence of a small biomass of legal-sized crabs in the Beaufort Sea
Pacific herring, capelin, and rainbow smelt	Unlikely because of their importance to subsistence harvest and as forage species for marine mammals, seabirds, and other predators
Chinook, pink, chum, and sockeye salmon	Highly unlikely because of their importance to subsistence harvest and because their catch is prohibited throughout the EEZ (i.e., outside state waters) by the salmon fishery management plan

mammals, birds, and coastal communities are dependent on the marine productivity they represent, the United States has adopted a precautionary approach to the exploitation of these resources as they become more available.

In 2012 more than 2,000 scientists from 67 countries signed an open letter urging the Arctic nations to close the international waters of the Arctic Ocean—the high Arctic waters at the center of the ocean beyond the EEZs of those nations—to all fishing. Although reaching the international agreement necessary to achieve this goal will be far more difficult than what was achieved in the U.S. EEZ, such an agreement is crucial to wise decisions about continued existence and sustainable use of Arctic marine living resources and to the protection of the Arctic ecosystem, biodiversity, and the ecosystem services that ecosystem provides to Arctic communities.

Arctic Report Card

The Arctic Report Card[22] 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 (CAFF) Working Group. Its purpose is to provide concise environmental information on the current state of the Arctic atmosphere, sea ice and ocean, marine ecosystems, terrestrial ecosystems, and hydrology and terrestrial cryosphere (Jeffries et al. 2012). Since 2006 when the first State of the Arctic Report was published, these annual report cards have provided succinct scientific assessments of measurable elements of Arctic change (See Arctic Report Card Highlights for 2012 on facing page).

The *Arctic Report Card 2012* chapter on marine mammals reviews recent advances made with autonomous acoustic recorders to document marine mammal seasonality and the acoustic environments in the Arctic (Laidre 2012, Moore et al. 2012). These recordings provide a continuous one-year acoustic "snapshot" of marine mammals and their environment in the Fram Strait (78.8°N, 5°W) between Svalbard and northeastern Greenland and on the Chukchi Plateau (75.1°N, 168°W) 555 km northwest of Barrow, Alaska. Recordings in Fram Strait revealed the year-round presence of bowhead whales and several odontocete species, as well as seasonal calling by blue and fin whales. Bowhead songs were recorded in this area nearly every hour from early November 2008 through

22 http://www.arctic.noaa.gov/reportcard/

Arctic Report Card Highlights for 2012 (excerpts from the Executive Summary, Overview and Highlights)

The *Arctic Report Card 2012* Executive Summary looks across the board at Arctic change. The following excerpts from the 2012 Overview and Highlights review major findings related to marine ecosystems.

A major finding of the Arctic Report Card 2012 is that numerous record-setting melting events occurred, even though, Arctic-wide, it was an unremarkable year, relative to the previous decade, for a primary driver of melting—surface air temperatures. The exception was Greenland where record-breaking air temperatures and near-ice sheet-wide surface melting occurred in summer 2012. From October 2011 through August 2012, positive (warm) temperature anomalies were relatively small over the central Arctic compared to conditions in recent years (2003–2010). Yet, in spite of these moderate conditions, new records were set for sea ice extent, terrestrial snow extent and permafrost temperature.

Large changes in multiple indicators are affecting climate and ecosystems, and, combined, these changes provide strong evidence of the momentum that has developed in the Arctic environmental system due to the impacts of a persistent warming trend that began over 30 years ago. A major source of this momentum is the fact that changes in the sea ice cover, snow cover, glaciers and Greenland ice sheet all conspire to reduce the overall surface reflectivity of the region in the summer, when the sun is ever-present. In other words, bright, white surfaces that reflect summer sunlight are being replaced by darker surfaces, e.g., ocean and land, which absorb sunlight. These conditions increase the capacity to store heat within the Arctic system, which enables more melting—a positive feedback. Thus, we arrive at the conclusion that it is very likely that major changes will continue to occur in the Arctic in years to come, particularly in the face of projections that indicate continued global warming.

A second key point in Report Card 2012 is that changes in the Arctic marine environment are affecting the foundation of the food web in both the terrestrial and marine ecosystems. While more difficult to discern, there are also observations that confirm the inevitable impacts these changes have on a wide range of higher-trophic Arctic and migratory species. Motivated by these linkages and the record-setting environmental changes in the Arctic region, a number of new programs are underway to more effectively measure, monitor and document changes in the marine and terrestrial ecosystems.

Sea ice extent in September 2012 reached the lowest observed in the satellite record (1979-present), with a related continued decline in the extent of thick multi-year ice that forms in the central Arctic Basin. This record was set despite a relatively high maximum sea ice extent in March 2012, which was due to extensive ice in the Bering Sea. March to September 2012 showed the largest seasonal decline in sea ice between the maximum and minimum extents during the satellite record. August 2012 was a period of exceptionally rapid ice loss, with accelerated decline during an intense storm in early August in the East Siberian and Chukchi seas. Illustrating the close connection between the timing and extent of the summer sea ice retreat and sea-surface ocean temperatures, a strong cold anomaly was evident in August in the Chukchi Sea due to the persistence of sea ice in this area even as the main body of the pack ice retreated northward.

Observations of the Arctic marine ecosystem provide further evidence of linkages between sea ice conditions and primary productivity, with impacts on the abundance and composition of phytoplankton communities. For instance, new satellite remote sensing observations show the near ubiquity of ice-edge blooms throughout the Arctic and the importance of seasonal sea ice variability in regulating primary production. These results suggest that previous estimates of annual primary production in waters where these under-ice blooms develop may be about ten times too low. At a higher trophic level, seabird phenology, diet, physiology, foraging behavior and survival rates have changed in response to higher water temperatures, which affect prey species." (Jeffries et al. 2012).

late April 2009 with call frequency highest during the darkest months, the coldest water temperatures, and areas with near 100 percent ice cover (Stafford et al. 2012). These records, which would have been impossible to obtain by visual methods, show that this may be a mating or wintering ground for the critically endangered Svalbard-Barents Sea subpopulation and suggest there may be more animals in this population than previously known (Moore et al. 2012, Stafford et al. 2012). Unexpectedly, fin whale sounds were also recorded in mid-winter at Fram Strait. This runs contrary to the general wisdom and previous findings that fin whales move south to more temperate waters in the winter (Moore et al. 2012). At the Chukchi Plateau site no marine mammals were recorded from December to February when the ice edge was as far as 1,900 km farther south in the Bering Sea. Bowhead and beluga calls were first detected in March, then recorded on most days from May to August. Again, the pioneering use of passive acoustic monitoring in an otherwise inaccessible area revealed unexpected results. The presence of bowhead whales in the northern Chukchi Sea throughout late spring and summer runs contrary to the previously documented pattern of bowhead movements through the Chukchi Sea into the Beaufort Sea along a migratory corridor in the spring and back to the west across the Beaufort and Chukchi Seas in late summer and early fall.

Arctic Council and Arctic Biodiversity Assessment

The Arctic Council is "a high-level intergovernmental forum that addresses primarily environmental protection and sustainable development issues in the Arctic region." The eight founding nations (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States) of the 1991 Arctic Environmental Protection Strategy comprise the member states of the Arctic Council."[23] In 2012 the Arctic Council moved forward on a number of efforts relevant to conservation of marine mammals in the changing Arctic. Several of these were described in the Commission's 2010–2011 annual report. With respect to Arctic shipping and as a follow-up to the AMSA and to oil and gas development operations, negotiations continued in the Working Group on Emergency Prevention, Preparedness and Response (EPPR) 2012 on an international agreement on Arctic marine oil pollution preparedness and response with the goal of producing a legally binding agreement to be signed at the 2013 Arctic Council Ministerial. Following a 2011 Arctic Council decision, the IMO continued development of a legally binding IMO polar code on ship safety and pollution prevention with requirements for ship construction, design, equipment, crews, safety, training, and operations, but the deadline for completion slipped from 2012 to 2014 at the earliest.

The Protection of the Arctic Marine Environment (PAME) Working Group of the Arctic Council continued work on an Arctic Ocean Review (AOR), to be completed by the May 2013 Arctic Council ministerial meeting. This review, initiated in 2009, is intended to "to provide guidance to the Council on possible ways to strengthen governance, and to achieve desired environmental, economic and social-cultural outcomes in the Arctic through a cooperative, coordinated and integrated approach to the management of activities in the Arctic marine environment" (PAME 2011). The review has been conducted in two phases. In the first phase, completed in 2011, PAME compiled information on global and regional measures relevant to the conservation and sustainable use of the Arctic marine environment and surveyed the status and trends in the Arctic marine environment to compile a document that identified and highlighted potential weaknesses in the overall governance system. In the second phase, to be completed in 2013, PAME is charged with producing "a final AOR Report to Arctic Council Ministers that will: summarize potential weaknesses and/or impediments in the global and regional instruments and measures for management of the Arctic marine environment; outline options to address these weaknesses and/or impediments; and, make agreed recommendations to help ensure a healthy and productive Arctic marine environment in light of current and emerging trends" (PAME 2011).The CAFF Working Group continued work on the Arctic Biodiversity Assessment (ABA), also slated for conclusion and endorsement at the

23 http://www.state.gov/e/oes/ocns/opa/arc/ac/

2013 Arctic Council Ministerial. This report will update the status and trends for Arctic marine mammal populations for the first time since a 2007 Marine Mammal Commission-sponsored workshop on monitoring Arctic marine mammals (Simpkins 2009) and it will incorporate information on Arctic biodiversity trends published in the first phase of the ABA project (CAFF 2010).

Alaska Native Consultation Meeting

Executive Order 13175 directs federal agencies to consult with Indian tribal governments, including Alaska Native communities, when formulating or implementing policies that affect tribal interests. In the Alaska Arctic, those interests include subsistence resources such as bowhead whales, walruses, ice seals, polar bears, and fisheries. Tribal consultation is intended to provide Alaska Natives and other tribal governments with an effective process that ensures the tribes' concerns regarding proposed federal actions are heard and addressed well before any final decisions are made.

In 2008 the Marine Mammal Commission conducted a review of marine mammal co-management efforts by federal agencies and Alaska Native organizations.[24] As a follow-up to that review, the Commission, in collaboration with the Environmental Law Institute, convened a meeting in December 2012 to review and seek ways to improve consultations between federal agencies and Alaska Native tribes. Participants included representatives of various federal agencies, Alaska Native organizations, oil and gas companies, environmental organizations, and other interested parties. The purpose of the meeting was to improve the consultation process between federal agencies and Alaska Natives, with the ultimate goal of strengthening the participation of Native communities in matters that affect them. At the end of 2012 the Environmental Law Institute was working on preparing a summary of the consultation meeting. In addition, the Commission was considering possible next steps to be taken to help improve the consultation process.

The meeting participants identified the essential elements of tribal consultations and discussed ways to improve them. They also considered issues related to the authorities for Alaska Native consultations and delegations of those authorities by Native villages, the role of the Indigenous People's Council for Marine Mammals (IPCoMM) and Alaska Native organizations in tribal consultations, the relationship between tribal consultation and co-management under the Marine Mammal Protection Act, and lessons learned from conflict avoidance agreements[25] and plans of cooperation.[26] Some participants believed that IPCoMM, because of its experience working with other Alaska Native organizations on marine mammal issues, could provide a forum for sharing information on proposed agency actions and soliciting input from Alaska Native communities. The Commission suggested that IPCoMM also play a lead role in helping to develop guidance on how consultations for actions that may affect marine mammals should be conducted. IPCoMM and the Environmental Law Institute agreed to work together to draft that guidance, with input from tribal governments, other Alaska Native organizations, and others as appropriate. At the end of 2012 the Commission was considering how best to encourage and support those efforts.

24 http://www.mmc.gov/pdf/mmc_comgmt.pdf.

25 Conflict avoidance agreements are agreements that have been negotiated annually since 1982 between the Alaska Eskimo Whaling Commission (AEWC) and oil and gas companies (including seismic companies) operating in the U.S. Arctic Ocean. The purpose of these legally binding agreements is to identify and implement mitigation measures to avoid conflicts between the oil and gas industry and Alaska Natives who subsistence hunt for bowhead whales. The agreements have been expanded in recent years to include whaling captains' associations from eleven Alaska Native communities that hunt for bowhead whales in the Chukchi and Beaufort Seas, in addition to the AEWC.

26 Plans of cooperation are documents required to be submitted to the National Marine Fisheries Service by oil and gas companies identifying "what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses." (50 C.F.R. § 216.104(a)(12)). Plans of cooperation apply to all marine mammals species that may be taken in the course of oil and gas operations

Arctic/Alaska Species of Special Concern

Polar Bear
(Ursus maritimus)

The polar bear, perhaps the quintessential symbol of the Arctic, is the largest living species of bear (genus *Ursus*). Polar bears are distributed throughout the circumpolar Arctic in 19 populations[27] 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, the effects of climate change have led to a rapid decrease in sea ice habitat. The projected effects of climate change, 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, as modified by Vongraven and Richardson (2011), is presented in Table II-5. Reliable abundance estimates are not available for four of the populations and the estimates for five other populations are more than 10 years old. Of the 19 populations, the best available data indicate 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 II-11). The southern Beaufort Sea population numbers about 1,500 animals and is shared with 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 and 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 Polar Bear Specialist Group identifies this population as one with a moderate risk of future decline.

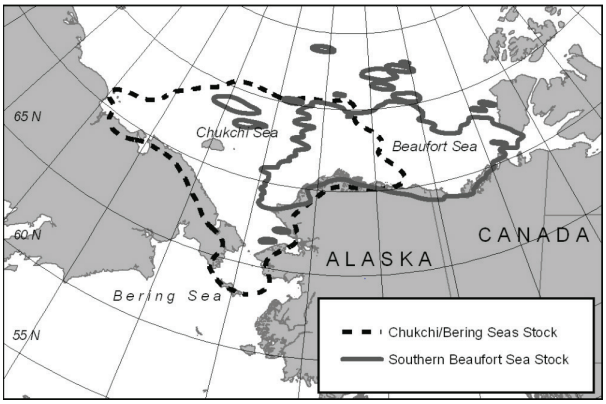

Figure II-11. Map of the Southern Beaufort Sea and the Chukchi/Bering seas polar bear stocks. (Source: Fish and Wildlife Service)

27 Although we use the term population here and elsewhere in this section, it is not clear that these 19 divisions qualify as "distinct population segments" under the Endangered Species Act or as "population stocks" under the Marine Mammal Protection Act. The Polar Bear Specialist Group refers to these divisions as "subpopulations." Elsewhere, these divisions are referred to as "management units," which are treated as discrete populations for management purposes. The Fish and Wildlife Service has identified two separate stocks as occurring in Alaska.

Table II-5. Abundance, trend, and relative status of the 19 polar bear populations (Source: Obbard et al. 2010 (as modified by Vongraven and Richardson 2011))

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 second population under the jurisdiction of the United States, the Chukchi/Bering Seas stock, is shared with Russia (Lunn et al. 2002). Only a best-guess approximation of abundance of about 2,000 bears is available, but this is unsupported by comprehensive surveys or rigorous science. Otherwise, little information is available on the trend or status of the Chukchi/Bering Seas stock. The Polar Bear Specialist Group's 2010 summary indicates that this population is "reduced" and "declining." Illegal taking in Russia may have contributed to such a decline,[28] despite the fact that hunting has been prohibited in Russia since 1956. As with the southern Beaufort Sea stock, this stock also has experienced a reduction in sea ice habitat in recent years (Durner et al. 2009). However, ecological indicators for the Chukchi/Bering Seas population suggest that in recent years these bears have retained sufficient access to prey to support good body condition and reproductive success despite a significant increase in the number of ice-free days (Rode et al. in review).

Stock assessments: Section 117 of the Marine Mammal Protection Act requires the Fish and Wildlife Service to prepare stock assessments for "strategic" marine mammal stocks that occur in U.S. waters. Once prepared, section 117 of the Marine Mammal Protection Act further requires such reports for "strategic" stocks to be reviewed at least annually and revised if that review indicates the status of the stock has changed or can be more accurately determined. The southern Beaufort Sea and Chukchi/Bering Seas stocks of polar bears are listed as threatened under the Endangered Species Act and are considered "strategic."

The Service published a notice of availability of polar bear stock assessment reports on 30 December 2009 (74 Fed. Reg. 69139). Those reports are

28 See page 4 of the 2010 stock assessment report at http://www.nmfs.noaa.gov/pr/sars/species.htm

available on the Service's website.[29] The Service determined in 2010, 2011, and 2012 that the status of those stocks had not changed or could not be more accurately determined and, therefore, it did not update either report in those years.

Listing polar bears under the Endangered Species Act: As explained in previous Commission annual reports, 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." The Service's response to that petition and its subsequent analyses, as well as the Commission's comments and recommendations on the proposed listing, are provided in previous Commission annual reports.

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 as the primary threat to the species, 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 the polar bear 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 (73 Fed. Reg. 28306) under section 4(d) concurrent with its listing decision on 15 May 2008 and, after receiving public comments, including those of the Commission, 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). The basis of the interim and final rule and its elements are described and discussed in detail in the Commission's 2010–2011 annual report[30] as are the Commission's comments.

As discussed later in this section, a federal district court invalidated the 16 December 2008 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 went back into effect pending a new rulemaking.

The Service published a proposed rule on 19 April 2012 to reinstate the invalidated 16 December 2008 rule, along with an associated environmental assessment. The Commission submitted comments on the proposed rule on 3 August 2012, concurring with the Service that reinstating the vacated rule was preferable to leaving the interim rule in place. However, as was the case in 2008, the Commission did not believe that the rule went far enough in promoting the conservation of polar bears. Specifically, the Commission thought that by exempting activities outside of the current range of the species from the incidental take provisions of the Endangered Species Act, the Service had failed to address the primary threat to polar bears that prompted its listing—the ongoing and predicted loss of the species' sea ice habitat as a result of climate change associated with

29 http://www.fws.gov/alaska/fisheries/mmm/polarbear/reports.htm

30 http://mmc.gov/reports/annual/pdf/2010-2011/Chapter_IV_Species_of_Special_Concern_in_US_Waters.pdf

greenhouse gas emissions. As such, the Commission again recommended that the Service address the ongoing and projected loss of sea ice in the special rule, which should be tailored specifically to the conservation needs of polar bears and the threats that they face. Toward this end, the Commission preferred other alternatives identified in the environmental assessment, particularly the alternative that the Service apply the full suite of protections afforded under section 9 of the Endangered Species Act to the polar bear. At a minimum, the Commission thought that the Service should omit any geographical limitation on the applicability of the incidental take prohibition.

At the end of 2012 the Service was preparing a final polar bear special rule. Publication of the final rule is expected early in 2013.

Critical habitat: As explained in the 2010–2011 Commission annual report, section 4(b)(6)(C) of the Endangered Species Act requires that critical habitat be designated for newly listed endangered or threatened species. The Fish and Wildlife Service published a final rule on 7 December 2010 designating critical habitat for polar bears within areas under U.S. jurisdiction (75 Fed. Reg. 76086) (Figure II-12). That designation included three components—sea ice habitat, terrestrial denning habitat, and barrier islands—but was somewhat smaller than the area originally proposed. Further information and detailed maps illustrating the area designated as critical habitat can be found on the Service's website.[31]

On 1 March 2011 the Alaska Oil and Gas Association filed a lawsuit challenging the critical habitat designation. The state of Alaska, the North Slope Borough, 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 impact of the designation when weighing its costs and benefits. 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 before the U.S. District Court for the District of Alaska at the end of 2012.

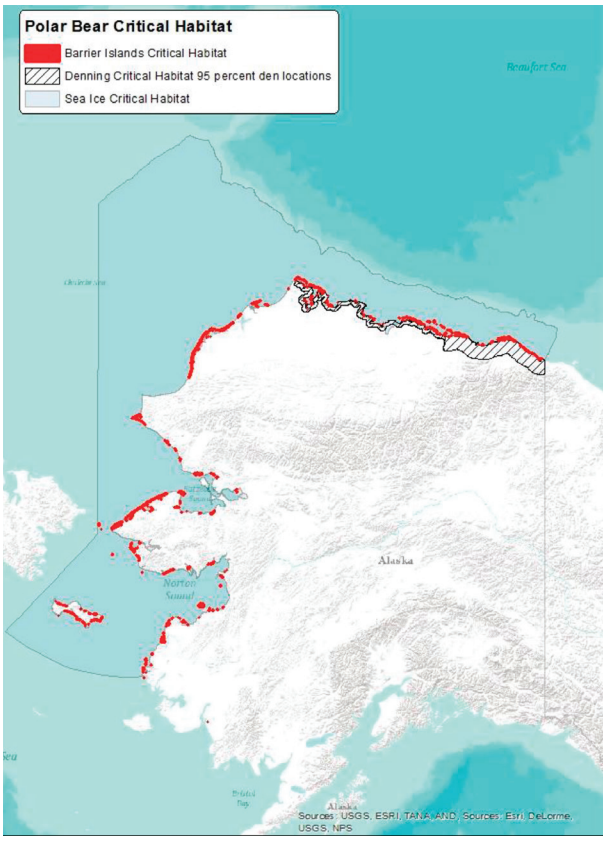

Figure II-12. Map of polar bear critical habitat. (Source: Fish and Wildlife Service)

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,

31 http://alaska.fws.gov/fisheries/mmm/polarbear/esa.htm

(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 toward 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 the impact associated with climate change, 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.

To begin developing 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 the potential impact of climate change. The third stakeholder meeting focused on actions that could be taken to mitigate the potential impact 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 website.[32]

As discussed below, the parties to the Agreement on the Conservation of Polar Bears have agreed to develop national action plans that will form the basis for a circumpolar action plan that will integrate conservation efforts across the five polar bear range states. The parties believe that a coordinated research and monitoring effort is necessary to improve the 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 United States expects that, to a large extent, the recovery plan will constitute its national action plan.

At the end of 2012 the Service was continuing to work on a draft plan but was revisiting an earlier decision to forego establishing a recovery team to assist in formulating the plan. If it decides to use a recovery team to draft a recommended plan, it is unlikely that a draft will be available for public review and comment until 2014.

Trophy imports: The 1994 amendments to the Marine Mammal Protection Act allowed 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. 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 requisite finding of sustainability 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,[33] 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

32 http://alaska.fws.gov/fisheries/mmm/polarbear/esa.htm#recovery_plan

33 http://www.doi.gov/solicitor/opinions.html (see section M-37015)

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. However, that ruling was appealed and disposition of the appeal was pending at the end of 2012.

On 9 March 2011 Congressman Young of Alaska introduced H.R. 991, a bill to authorize the importation of those polar bear trophies that had been legally harvested in Canada from one of the approved populations and for which a permit application had been submitted prior to the date on which the polar bear was listed as threatened. This would apply to approximately 40 trophies. A similar, although somewhat broader, bill, S. 1066, was introduced in the Senate. The House Committee on Natural Resources favorably reported on H.R. 991. Ultimately that bill was consolidated with other hunting-related bills into H.R. 4089, the Sportsmen's Heritage Act of 2012, which the House passed on 17 April 2012. However, no further action on the bill was taken by the Senate.

Litigation: The Service's listing of the polar bear and issuance of the special rule in 2008 almost immediately spawned a variety of legal challenges. Conservation groups contended that the species should have been listed as 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 the polar bear 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."

Two subsequent October 2011 opinions issued by Judge Sullivan and a challenge of the 4(d) rule by conservation groups are described in the Commission's 2010–2011 annual report.

Those opposed to listing the polar bear appealed the district court's 30 June 2011 ruling, and several conservation groups intervened on behalf of the Fish and Wildlife Service. The court of appeals heard oral argument on 19 October 2012 and was expected to issue its ruling in 2013. The Safari Club also appealed the district court's ruling on the trophy import issue. The appellate court had yet to hear that case at the end of 2012.

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 II-6). 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 Service recognizes that tagging compliance is less than 100 percent, and is working to improve this requirement with subsistence hunters.

The number of bears taken from the Chukchi/Bering Seas stock has declined since the 1980s. The average annual reported take in the 1980s was 92; this fell to about 50 per year during the 1990s, and about 33 per year over the past 10 years. The causes for this decline 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 2012 the number of bears taken from this population increased to 55 bears, the highest number taken since 2002. This was the second consecutive year of increased hunting after record lows in 2009 and 2010. More importantly, the harvest in 2012 far exceeds the United States share (29 bears) of the sustainable harvest limit adopted for this population by the United States–Russia Polar Bear Commission, although that limit has yet to be implemented.

Hunting of bears from the southern Beaufort Sea stock showed less inter-annual variation than from the Chukchi/Bering Seas stock and had remained between 14 and 18 bears per year between 2007 and 2011. The number of bears taken by hunters from this stock was higher in 2012, with 23 bears reported. It is not clear why hunting activity in this area has been more constant, but the reason may reflect management of the hunting of this stock under

Table II-6. 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	83	25	58
2007	68	17	51
2008	40	19	21
2009	30	17	13
2010	26	14	12
2011	60	18	42
2012	80	24	57
Average	**90**	**33**	**58**

the North Slope Borough/Inuvialuit Game Council agreement. However, recent harvests in the United States remain well below the quota levels under that agreement.

International polar bear agreements: Polar bears can traverse great distances, often crossing national boundaries and moving into international waters and therefore 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 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.

The Commission's 2010–2011 annual report discussed the activities under the Agreement from 2007 to 2011. Among other things, the Parties agreed at their 2011 meeting in Iqaluit, Canada, to take the steps necessary to complete national action plans that would form the basis of a circumpolar action plan to promote polar bear conservation. The United States expects the recovery plan being prepared under the Endangered Species Act to serve as its national action plan. Work on that plan is discussed above. The next range states meeting, to be hosted by Russia, is scheduled to take place near the end of 2013. It is expected that the participants at that meeting will continue to work toward developing a circumpolar action plan and a circumpolar polar bear monitoring plan.

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 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 take 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 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 website maintained by the Fish and Wildlife Service's Alaska Region.[34]

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—

- sets forth the procedures by which U.S. commissioners are selected,
- establishes 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,
- relies on the existing authorities under Title I of the Act for enforcement,
- directs the Secretary of the Interior to promulgate regulations to implement the provisions of the Act and the agreement,
- authorizes the Secretary to share authority for managing the taking of polar bears with the Alaska Nanuuq Commission, and
- allows 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.

The U.S.–Russia Polar Bear Commission held its first meeting in September 2009. The parties agreed to hold annual meetings with the two countries alternating 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 polar bear 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.

In accordance with Article VII of the agreement, the commission established a scientific working group and assigned responsibility to that group to provide guidance on a variety of scientific matters related to the 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 working group met prior to the 2010 commission 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. After further deliberations of the working group, 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 not only the authorized kills by hunters but all human-caused removals (e.g., bears taken illegally or in defense of life) would be counted against the quota. In addition, the commission assigned the working group the task of formulating recommendations on how the new limit would be administered, including consideration of multi-year harvest limits.

At their 2011 meeting, the parties to the bilateral agreement adopted recommendations made by the

34 http://www.fws.gov/alaska/fisheries/mmm/polarbear/bilateral.htm

working group concerning the adoption of a multi-year harvest management system. That scheme established upper limits on both 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 multi-year quota system for an initial five-year period.

The scientific working group met in March 2012 to review new research findings and to provide recommendations to the commission on harvest levels, country-specific hunting seasons, and a joint U.S.-Russia study plan. The working group concluded that there was no need to change the sustainable harvest level adopted at the previous commission meetings.

The U.S.–Russia Polar Bear Commission held its fourth meeting in Anchorage, Alaska, on 25–27 June 2012. Based on the recommendations of the scientific working group, the commission agreed that no change to the sustainable harvest level of 58 bears adopted in 2010 was necessary. Consequently, the commission adopted a five-year harvest level of 290 bears, with no more than one-third of harvested bears being females. Debits and credits could be carried forward into subsequent years, with debits accrued in any given year capped at 25 percent over the annual harvest level (e.g., no more than 72 bears could be taken in the first year, with any taking beyond 58 bears to be subtracted from harvests in subsequent years). The commission did not anticipate that the two countries would be ready to begin implementing the new multi-year quota system until 2014. On the U.S. side, the Fish and Wildlife Service plans to conclude a co-management agreement with the Alaska Nanuuq Commission to provide the necessary oversight and to establish shared enforcement authority.

In recognition of the need for coordinated research on the polar bear population shared by the United States and Russia, the scientific working group presented the commission with a joint study plan for its consideration. Among other things, that plan identified a need to improve existing mechanisms for transferring funds, samples, and personnel between the two countries. The commission agreed that there was a need to improve collaboration on research efforts and requested that the working group prepare a list of specific matters to be considered at future meetings.

Russia announced that it would host the next meeting of the bilateral polar bear commission in St. Petersburg in June 2013.

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. As discussed in the CITES section of Chapter IV, the United States unsuccessfully proposed at the 2010 Conference of Parties to CITES that the listing status of polar bears be changed to Appendix I. The Fish and Wildlife Service, on behalf of the United States, put forward a similar polar bear uplisting proposal in 2012 for consideration at the 2013 meeting of the CITES parties.

Pelly Amendment: The Pelly Amendment to the Fishermen's Protective Act of 1967 (22 U.S.C. § 1978) directs the Secretary of the Interior to certify to the President when nationals of a foreign country, either directly or indirectly, are engaging in trade or taking that diminishes the effectiveness of any international program for endangered or threatened species. On 23 January 2012 the Center for Biological Diversity petitioned the Secretary to certify Canada under the Pelly Amendment for diminishing the effectiveness of the 1973 Agreement on the Conservation of Polar Bears. The petitioners claimed that the harvest limits adopted by the Canadian Territory of Nunavut are contrary to the agreement's requirement that polar bears be managed "in accordance with sound conservation practices based on the best available scientific data." Action by the Fish and Wildlife Service on that petition was pending at the end of 2012.

North Pacific Right Whale (*Eubalaena japonica*)

The North Pacific right whale is one of the most endangered of all the world's great whales. There are two surviving populations, one in the eastern and one in the western North Pacific Ocean. The eastern North Pacific population is found annually in summer and early fall in the eastern Bering Sea off Alaska, with a few whales also seen in the northern Gulf of Alaska. Although hunting for right whales was banned under the International Convention for the Regulation of Whaling of 1931 and subsequent whaling conventions, the eastern population was nearly extirpated by illegal Soviet whaling that killed at least 529 right whales in Alaska waters in the 1950s and 1960s (Doroshenko 2000, Ivashchenko and Clapham 2012). The eastern population is now thought to number about 30 animals, making it the most endangered population of large whales in U.S. waters and possibly in the world (Wade et al. 2011, LeDuc et al. 2012).

The western North Pacific population feeds during the summer in the Sea of Okhotsk, waters southwest of the Okhotsk Sea and perhaps other areas (Miyashito and Kato 1998). Some scientists suggested that it numbered about 900 whales (n = 922, 95 percent confidence interval 404–2,108) in the 1990s (Miyashito and Kato 1998), but that estimate is imprecise and dated. Brownell et al. (2001) concluded that the population size of the western population was likely in the "low hundreds" in the 1990s. Like the eastern population, the western population was subject to illegal Soviet whaling in the 1960s when at least 152 whales were killed off Russia (Ivashchenko and Clapham 2012). Wintering and calving grounds are unknown for both populations.

In 1996 four right whales were observed feeding together in the southeastern Bering Sea on the western margins of Bristol Bay (Goddard and Rugh 1998). Subsequently, the National Marine Fisheries Service began conducting regular aerial or shipboard surveys each summer in the southeastern Bering Sea to document and assess the status of right whales there[35] (Figure II-13). Efforts focused on developing a photo-identification catalogue, collecting and analyzing genetic samples, tagging and tracking individuals with satellite telemetry, and monitoring important habitat areas acoustically to detect vocalizing right whales. Over the next decade, a small number of North Pacific right whales were seen each year in the eastern Bering Sea from July through September. Right whale calls were also detected in the area throughout the year although the frequency of calls dropped off significantly in January, suggesting possible migration to the south at that time of year (Munger et al. 2008). In 2008 the Service used information from that research to designate two areas where right whales had been seen most often since 1980 as critical habitat—one in the eastern Bering Sea and the other a small area south of Kodiak Island.

When coupled with research by other investigators, the Service's studies have provided many important new insights regarding the status of the species. For example, Rone et al. (2012) and Marques et al. (2011) used passive acoustic devices to locate, verify, and assess the species' occurrence in the southeastern Bering Sea. LeDuc et al. (2012) analyzed genetic samples and found evidence of some genetic differentiation between the eastern and western populations and a sex ratio highly skewed toward males. Gregr (2011) reviewed historical whaling records and found evidence suggesting that right whales in the eastern and western North Pacific are two separate populations. Given the very small size of the eastern population, the demonstrated vulnerability of right whales to ship strikes and entanglement in fishing gear (see Chapter III section on North Atlantic right whales), and the uncertainty regarding winter distribution, it may be at great risk of extinction. The situation underscores the need for further research to better understand the population's seasonal distribution and movements across its range.

From 2007 to 2010 almost all research on eastern North Pacific right whales was supported by the Minerals Management Service (now the Bureau of Ocean Energy Management) through an interagency agreement with the National Marine Fisheries Service. The agency provided about $1 million a year for information on the species' distribution in support of plans for a scheduled offshore oil and gas lease sale in the southeastern Bering Sea. When plans for

35 http://www.afsc.noaa.gov/nmml/species/species_right.php

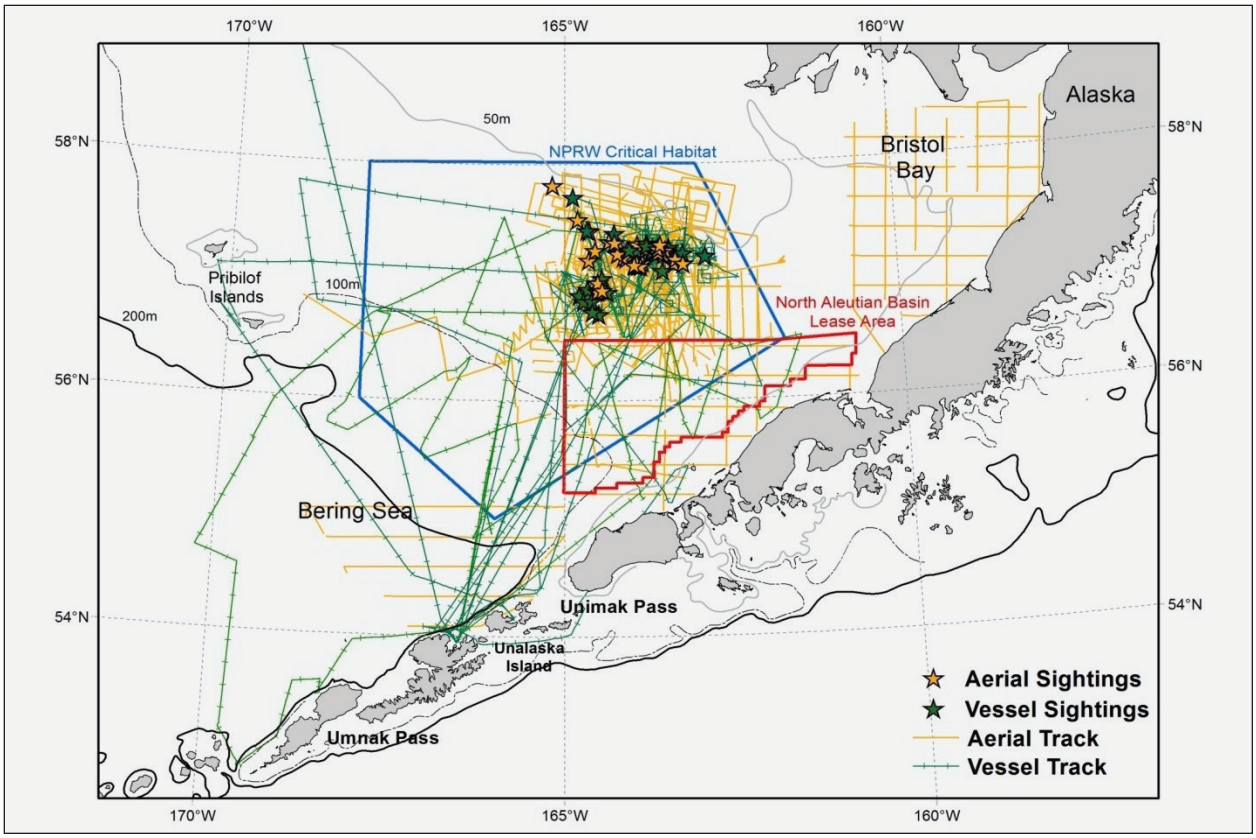

Figure II-13. Sightings of North Pacific right whales and survey track lines in and around the species' critical habitat in the southeastern Bering Sea between 1996 and location of the withdrawn oil and gas lease sale area (Figure courtesy of P. Clapham, Alaska Fisheries Science Center, National Marine Fisheries Service)

the sale were canceled, however, the Bureau withdrew its funding for right whale research. As a result, research to resolve questions about North Pacific right whale distribution, movement, life history, and potential threats was suspended, and almost no field work has been undertaken since 2010.

On 20 March 2012 the Center for Biological Diversity, a non-governmental environmental organization, filed a notice of intent to sue the National Marine Fisheries Service for failing to develop a recovery plan for North Pacific right whales under the Endangered Species Act. The Service agreed to prepare a plan, and at the end of 2012 it was expected that a draft plan would be circulated for public review and comment early in 2013.

Arctic Pinnipeds

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 Pacific walrus (*Odobenus rosmarus divergens*). 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 and management of seals and, on matters pertaining to ice seals, it cooperates with the Ice Seal Committee, which is composed of Alaska Native representatives. They and their constituents hunt and use seals for subsistence. The Fish and Wildlife Service is the lead federal agency responsible for conservation and management of the walrus, and it cooperates primarily with the 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, local agencies, tribal organizations, and conservation organizations to conduct and support research and management activities related to ice seals and walruses.

Until recently scientists generally have assumed that ice seal populations in U.S. waters were relatively unaffected by human activities. As is now evident, climate change, 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 the marine ecosystem.

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 stock assessment reports.[36] The ice seals live in remote and challenging environments and, as a consequence, research and assessment are logistically challenging and expensive. Nonetheless with the growing awareness of climate change and the associated threats to the Arctic marine ecosystem, there is a need for the Services to garner the resources needed to assess changes in the health and status of these species and to develop management strategies that will protect and conserve them in the foreseeable future.

Record low sea ice in 2007 and 2012 heightened concerns about the effects of climate change on pinnipeds that use sea ice for multiple purposes, including resting, reproduction, foraging, molting, and predator avoidance. In addition to changes in the physical environment, climate change will lead to increased human activities aimed at studying, securing, and using the Arctic's natural resources. Such activities include oil and gas development, commercial shipping, commercial fishing, military operations, tourism, scientific research, and coastal development. Individually or collectively, these activities may affect ice seals and walruses by disturbing them at sea, on ice or on land, displacing them from important habitat, contaminating their feeding and resting areas, and injuring or killing them.

Prompted by listing petitions focused primarily on threats posed to these species by climate change, over the past six years the National Marine Fisheries Service and Fish and Wildlife Service have conducted status reviews of the five Arctic pinniped species to determine if they warrant listing under the Endangered Species Act. Following the information presented in the Commission's 2010–2011 annual report, the following sections summarize the general biology, threats, and recent information from those status reviews and update the status of listing decisions for ringed, bearded, and ribbon seals.[37] There were no significant updates of information or changes in the listing status of spotted seals in 2012.

Petitions to list Arctic 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 the bearded, ringed, and spotted seals under the Endangered Species Act. The petitions were based on known, apparent, and predicted threats from (1) loss of sea ice, (2) suspected high take levels in Russia, (3) oil and gas exploration and development, (4) rising contaminant levels in the Arctic, and (5) bycatch by and competition for prey resources with commercial fisheries. Status reviews were completed for the spotted seal (October 2009), walrus (May 2010), bearded seal (December 2010), ringed seal (December 2010), and ribbon seal (December 2008, although after further litigation a new status review was initiated in December 2011). These status reviews provide comprehensive and valuable syntheses of current knowledge of these species and also reveal significant deficiencies in the data needed to make informed management decisions.

Ringed seal (*Pusa hispida*): The ringed seals are the smallest, most abundant, and most ice-dependent of the Arctic seals. Five subspecies are recognized. The most widely distributed (*P.h. hispida*) occurs throughout the Arctic Ocean. The others are *P.h. ochotensis*, which is found in the Sea of Okhotsk, *P.h. botnica* in the Baltic Sea, and two freshwater subspecies, *P.h. saimensis*, which is endemic to Lake Saimaa, eastern Finland, and *P.h. ladogensis*, which

36 http://www.nmfs.noaa.gov/pr/sars/region.htm

37 http://www.mmc.gov/reports/annual/welcome.shtml

is endemic to the nearby Lake Ladoga system, northwestern Russia (Figure II-14). 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 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. Ringed seal pups, which are approximately 50 percent fat by weight, are a key part of the polar bear diet (Stirling 2002). In the eastern Beaufort Sea, up to 80 percent of polar bear prey is young-of-the-year ringed seals. If ringed seal productivity declines, the health of the polar bear population is likely to suffer (Stirling 2002).

Status and trends: Arctic ringed seals have not been surveyed in all parts of their range, and their current overall abundance is unknown but has been characterized in the realm of "at least a few million" (Reeves et al. 1998). The Arctic and Okhotsk subspecies are the most abundant. Previous informed guesses for Arctic ringed seal abundance in the Alaska Bering, Chukchi, and Beaufort Seas range from 1 to 4 million (e.g., Frost et al. 1988, Kelly 1988). In 2012 the National Marine Fisheries Service, in conjunction with Russian scientists, conducted extensive spring aerial surveys for all ice seals in the U.S. and Russian Bering Sea. These were to be repeated in 2013. Preliminary results from the 2012 surveys are expected in early 2013, but these will only represent a partial estimate of overall abundance in the western Arctic as many ringed seals are north of the Bering Strait at the time the surveys are conducted.

Elsewhere, the Baltic ringed seal subspecies numbered between 190,000 and 220,000 a century ago, but by the late 1970s had been reduced to as few as 5,000 (Harding and Harkonen 1999). Although commercial hunting was the most likely cause of the decline, there is evidence that reduced fertility from exposure to environmental contaminants may also be a factor (Harding and Harkonen 1999). Climate-related changes in ice habitat and the persistence of contaminants in the environment will certainly play a role in the uncertain future status of this subspecies.

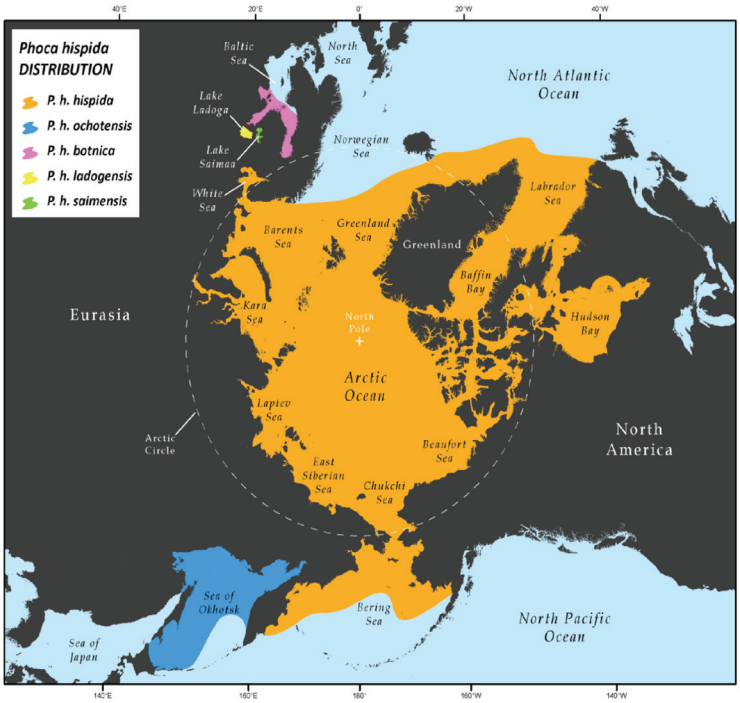

Figure II-14: Distributions of the five subspecies of ringed seals (*Phoca hispida*). Kelly et al. (2010) adapted from maps published by King (1964), Heptner et al. (1976), Frost and Lowry (1981), and Härkönen and Lunneryd (1992).

The International Union for Conservation of Nature lists the Ladoga ringed seal as endangered (Kovacs et al. 2012). At the start of the 20th century, the Ladoga subspecies numbered roughly 20,000 animals, but by the 1970s it had been reduced by half, in part due to bounty hunting (Agafonova et al. 2007). The population is still subject to high harvest levels, and recent bycatch is clearly unsustainable at 10 to 16 percent of the population per year (Verevkin et al. 2006). The Saimaa ringed seal numbers in the low hundreds and is red-listed by the IUCN as critically endangered. The survival of this subspecies will require well-designed and sustained management (Sipilä and Kokkonen 2008).

Effects of climate change and the need for listing: The Commission's 2010–2011 annual report discussed in detail the current and predicted consequences of climate change related changes to sea ice habitat and Arctic ecosystems on the ice-adapted life history and reproductive traits of Arctic ringed seals. Changes in sea ice

habitat will have a significant impact on ringed seals, and it is not clear to what extent they will be able to adapt to predicted future conditions. Continued research on their natural history, behavior, adaptability, and changes in abundance is required to predict and record the effects of climate change on ringed seals. Finally, climate change may be linked to the health of ringed seals. Chapter VI of this report describes a recent unusual mortality event involving ringed seals, other ice seals, walruses, and potentially polar bears. At the end of 2012 the cause of the event had not been determined but one hypothesis was that an as-yet unidentified pathogen may have extended its range northward as the Arctic warms.

On 4 September 2008 the National Marine Fisheries Service released a 90-day finding regarding the petition to list ringed seals (73 Fed. Reg. 51615). 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 Saimaa ringed seal is already listed as endangered.

On 23 March 2011 the Marine Mammal Commission wrote to the Service to support listing of the Okhotsk subspecies as threatened and to recommend further evaluation of the population structure of the Arctic subspecies, particularly, whether ringed seals in the Canadian Archipelago might comprise a separate subspecies. The Commission also recommended further evaluation of the status of and threats to the Baltic and Lake Ladoga subspecies, with consideration given as to whether they should be listed as endangered. Further, in its letter, 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 a realistic research budget; encouraged the Service to strengthen collaborative efforts among range states to assess the status and trends of ringed seal populations throughout the species' range; and encouraged the Service to strengthen collaboration with the Alaska Native community to monitor abundance and distribution of ringed seals, and use seals taken in the subsistence hunt 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, tissue contaminant levels, 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 impact on the seals. To further consider these uncertainties, the Service commissioned an independent peer review and published its findings in the *Federal Register* (77 Fed. Reg. 20773). On 7 May 2012 the Commission wrote to the Service and— finding no substantial new information in the peer review report that the ringed seal subspecies under consideration did not warrant listing—it reiterated its recommendations of 23 March 2011. In particular, the Commission reiterated that the Service should re-evaluate the status of and threats to the Baltic and Ladoga ringed seal subspecies and consider listing them as endangered.

On 28 December 2012 the Service published a final rule (77 Fed. Reg. 76706) listing the Arctic Okhotsk, and Baltic subspecies of the ringed seal as threatened and the Ladoga subspecies as endangered under the Endangered Species Act.

Harvests: Historically, ringed seals have been hunted for both commercial and subsistence purposes. Russian harvest statistics record commercial catches in the Okhotsk Sea as high as 72,000 animals a year between 1955 and 1965 and 20,000 per year in the Baltic in that period (Kovacs et al. 2008). During the 1990s Canadian Inuit average annual removals, including hunting loss, were estimated to be in the high tens of thousands (Reeves et al. 1998), and Greenland hunters reported taking roughly 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

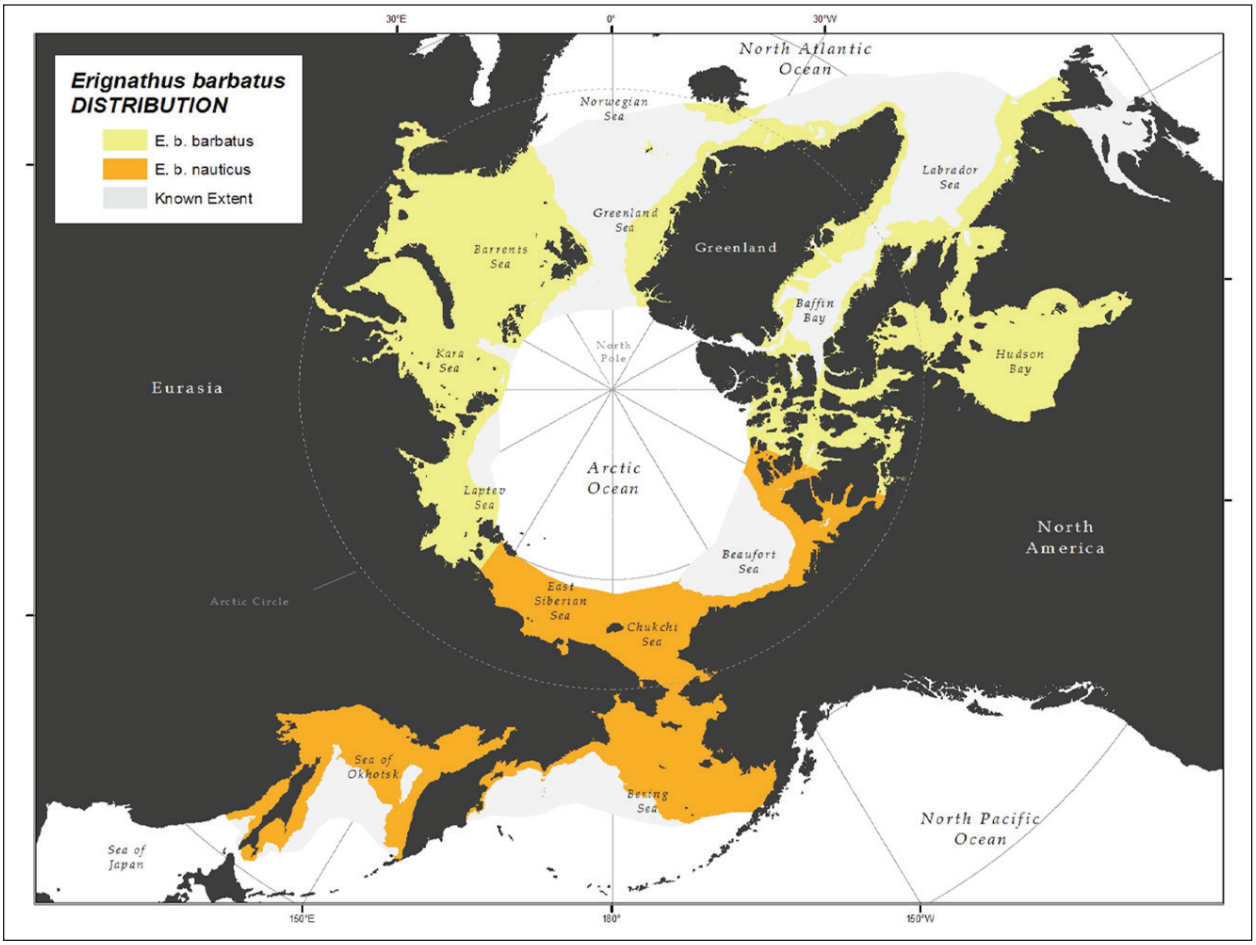

Figure II-15: The global distribution of bearded seals (Cameron et al. 2010) as adapted from maps of known extent in Burns (1981) and Kovacs (2002). The colored areas of core distribution are those areas of known extent that are in waters <500 m deep. The subspecies' range boundaries were approximated from the literature.

Game, conducted household subsistence surveys in 2006 and 2007, estimating that Alaska Natives from 12 communities in the Bering Strait region harvested roughly 1,350 ringed seals per year. Neither of these numbers includes animals struck and lost. Due to budget constraints, surveys since 2007 have been limited.

Stock assessment report: The National Marine Fisheries Service's most recent stock assessment report for the ringed seal was completed in 2009.[38] 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 assess the current status of ringed seals in the Arctic, judge the sustainability of subsistence hunting, or predict the impact of climate change or increasing human commercial uses of the Arctic.

Bearded seal (*Erignathus barbatus*): The bearded seal consists of two currently recognized subspecies, an Atlantic subspecies (*E.b. barbatus*) and a Pacific subspecies (*E.b. nauticus*), with overlapping distributions in the Russian and Canadian Arctic (Figure II-15). 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 Beaufort, Chukchi, and Bering Seas. They generally prefer loose, mobile pack ice with 70 to 90 percent coverage, cracks in large floes, and shorefast ice. In the spring in Alaska waters, they tend to be more abundant in pack ice

38 http://www.nmfs.noaa.gov/pr/sars/species.htm

from 20 to 100 nmi offshore except in Kotzebue Sound, where they occur in relatively high concentrations near shore (Bengtson et al. 2000, Bengtson et al. 2005, Simpkins et al. 2003). They maintain breathing holes 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. Bearded seals can live for up to 30 years and are the largest of the Arctic seals, measuring up to 2.5m in length and males weighing as much as 390 kg (Kelly 1988). A dense "beard" of long whiskers on the top lip and a relatively small head distinguish them from other seals. They are especially vocal underwater and, for millennia, Native hunters have used their underwater sounds to locate them. Bearded seals tend to be solitary but congregate in late winter in nearshore pack ice to give birth to pups on the ice, nurse the pups for about 15 days before weaning, 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 (*Orcinus orca*), Greenland sharks, and, occasionally, walruses prey on bearded seals.

Status and trends: Current population size and trends are not well known. Cameron et al. (2010) reviewed historical and current abundance and trends and produced estimates of 95,000 for the Sea of Okhotsk population and 125,000 for the Bering Sea 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 in the three areas combined. In 2012 the National Marine Fisheries Service, in conjunction with Russian scientists, conducted extensive spring aerial surveys for all ice seals in the U.S. and Russian Bering Sea. These were to be repeated in 2013. Preliminary results from the 2012 surveys are expected in early 2013 but these will only represent a partial estimate of overall abundance in the western Arctic as many bearded seals are north of the Bering Strait at the time the surveys are conducted.

Effects of climate change and the need for listing: The Commission's 2010–2011 annual report discussed in detail the current and predicted consequences of climate change related changes to sea ice habitat and Arctic ecosystems on the ice-adapted life history and reproductive traits of bearded seals. Changes in sea ice habitat and seasonal ice coverage are expected to affect bearded seals, and it is not clear to what extent they will be able to adapt to future conditions. Continued research on bearded seal natural history, behavior, adaptability, and changes in abundance is required to predict and record the effects of climate change on the species. 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. Most recently, this collaboration has focused on attempts to capture live adult seals and fit them with satellite-linked data recorders although only two adult bearded seals in Alaska have been tagged to date. The results from such studies will be useful in describing bearded seal distribution and movement patterns, diving and foraging behavior, key habitats, and other factors that can be used to develop correction factors for application to the results of surveys.

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 both the Sea of Okhotsk and Beringia bearded seal populations as distinct and threatened population segments of the Pacific subspecies. The Beringia distinct population segment is bounded to the north by the shelf-slopes in the Chukchi, Beaufort and East Siberian Seas and to the south by the shelf slope of the Bering Sea. The Service concluded that listing of the Atlantic subspecies was not warranted at that time.

As reported in the Commission's 2010–2011 report, on 23 March 2011 the Commission wrote to the Service, supporting listing of the Sea of Okhotsk and Beringia distinct population segments as threatened and recommending, among other things, further monitoring and periodic re-evaluation of the status of the Atlantic subspecies. 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 consider further the uncertainty in model predictions of future snow and ice conditions and the potential impact on the seals. The Service commissioned an independent peer review and published its findings in the *Federal Register* (77 Fed. Reg. 20774). On 7 May 2012 the Commission wrote to the Service and—finding no substantial new information in the peer review report that would indicate the bearded seal does not warrant listing—it reiterated its recommendations of 23 March 2011 that the Service proceed with the proposed listing of the Sea of Okhotsk and Beringia distinct population segments as threatened.

On 28 December 2012 the Service published a final rule (77 Fed. Reg. 76740) listing the Beringia and Sea of Okhotsk distinct population segments of the bearded seal as threatened under the Endangered Species Act.

Subsistence harvests: The bearded seal is one of the most important subsistence resources for 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 take levels are not known, but household subsistence surveys conducted in 2006 to 2007 by Kawerak, Inc., and the Alaska Department of Fish and Game indicated that 2,476 bearded seals were harvested by 12 communities in the Bering Strait area. In addition, some unknown number of bearded seals are struck and lost each year.

Stock assessment report: The National Marine Fisheries Service prepares a stock assessment report only for the Pacific subspecies because, with rare exceptions, bearded seals in U.S. waters are found 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.[39] 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 vulnerability to climate change, subsistence harvests, and the other human activities projected to increase in the Arctic in the foreseeable future.

Ribbon seal (*Histriophoca fasciata*): The ribbon seal is one of the most recognizable of all pinnipeds because of the striking pelage pattern of adults (Figure II-16). Ribbon seals occur primarily in the Okhotsk, Bering, East Siberian, and Chukchi Seas (Figure II-17) and 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 pupping, nursing, mating, and molting, all of which occur between March and June. During that period, they appear to prefer marine habitat 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 it for three or four weeks before weaning. As the ice cover retreats northward from the

39 www.nmfs.noaa.gov/pr/sars/species.htm

Figure II-16. An adult male ribbon seal. (Photo courtesy of Michael Cameron, NOAA)

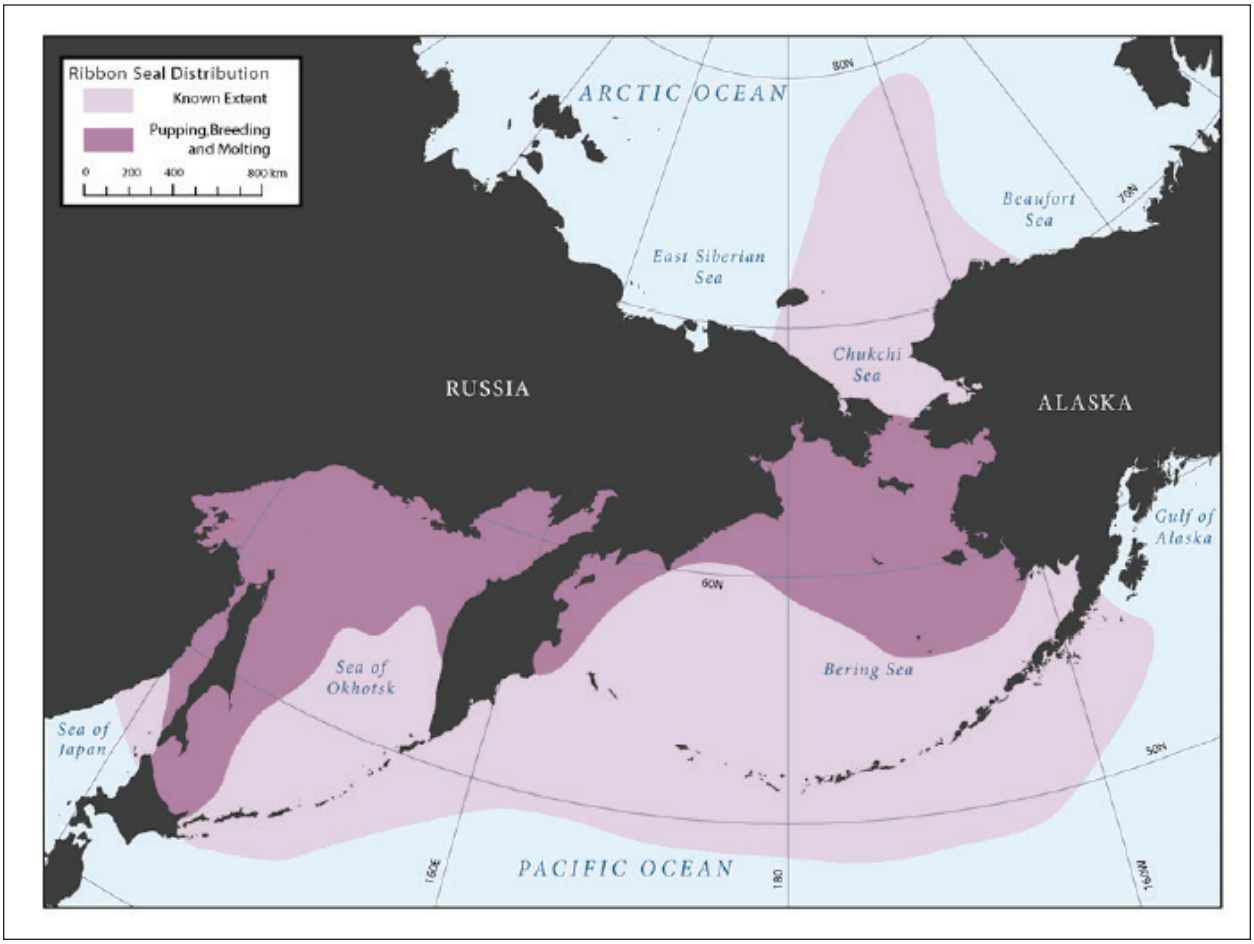

Figure II-17. The geographic distribution of ribbon seals, based on documented observations and satellite telemetry (Boveng et al. 2008).

Bering Sea 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 during much of their lives. They feed on pelagic fishes such as walleye pollock (*Theragra chalcogramma*) and 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 had increased from approximately 200,000 (1968–1974) to 630,000 (1988–1990). However, the accuracy of these estimates is unknown. 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 that estimate to be uncertain and cautioned that it should be considered a coarse approximation based on limited information. In 2012 the National Marine Fisheries Service, in conjunction with Russian scientists, conducted extensive spring aerial surveys for all ice seals in the U.S. and Russian Bering Sea. These were to be repeated in 2013. Preliminary results from the 2012 surveys are expected in early 2013.

The effects of climate change and the need for listing: The Commission's 2010–2011 report discussed in detail the current and predicted consequences of climate change related changes to sea ice

habitat and Arctic ecosystems on the ice-adapted life history and reproductive traits of ribbon seals. It also discussed the National Marine Fisheries Service's status review (Boveng et al. 2008), which concluded that the ribbon seal is not currently in danger of extinction nor likely to become so in the foreseeable future. The Service does expect however, that ribbon seal abundance will decline gradually as the extent, quality, and duration of sea ice declines. The Service therefore added the ribbon seal to its Species of Concern list[40] 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 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 had used in status reviews of the spotted, bearded, and ringed seals. The Service was still working to complete its revised status review and provide its 12-month finding at the end of 2012.

Subsistence harvests: Russian commercial hunters removed as many as 20,000 ribbon seals per year in the 1950s, but current removals in Russia are primarily for subsistence use. In Alaska, household surveys in the 1980s and 1990s indicated 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 numbers do not include seals that were struck but lost. Due to budget constraints, household subsistence surveys have been limited since 2007.

Stock assessment report: The most recent stock assessment report for the ribbon seal was completed in 2009.[41] It included a preliminary abundance estimate for the eastern and central Bering Sea of 49,000 seals, which is considered similar to historical estimates and was used to infer that the stock has not experienced any major changes in recent decades. The report did not include a minimum population estimate or an estimate of the potential biological removal level, given the uncertainty in the abundance estimate.

Pacific Walrus (*Odobenus rosmarus divergens*): Marine mammal scientists divide the walrus (*Odobenus rosmarus*) into two subspecies: Atlantic walruses (*O. r. rosmarus*) and Pacific walruses (O. r. divergens). The Atlantic subspecies is considerably less abundant than the Pacific subspecies, is less well studied, and does not occur in U.S. waters (Table II-7). Although some marine mammal and taxonomic literature recognizes the Laptev walrus as a separate subspecies (*O. r. laptevi*), the Society for Marine Mammalogy does not.[42]

Pacific walruses, which occur in and along the coasts of the Bering, East Siberian, Chukchi, and western Beaufort Seas, 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

41 www.nmfs.noaa.gov/pr/sars/species.htm

42 http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=645&Itemid=340

Table II-7. Current abundance estimates and trends for Pacific, Atlantic, and Laptev Sea walruses

Region	Abundance	95% Confidence Interval	Year	Trend
Pacific (Bering-Chukchi Seas)[a]	129,000*	55,000 to 507,000	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 full range of Pacific walruses (see text)

40 www.nmfs.noaa.gov/pr/species/concern/#list

every two or three years, breeding in late winter and usually giving birth about 15 to 17 months later. They feed in shallow waters, usually less than 80 m deep, and consume mostly clams and other benthic invertebrates such as snails and marine worms. Walruses also are known to kill and eat seals although they are not considered to be common prey. Collectively, Pacific walruses 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 natural predators of walruses.

In winter, most Pacific walruses can be found near polynyas and leads in the ice south and west of St. Lawrence Island and in Bristol and Kuskokwim Bays. In summer, most females, juveniles, calves, and some males 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 movable resting platform that passes over feeding grounds, allowing the walruses access to prey while reducing the likelihood that any single feeding site will become depleted. Most adult males remain year-round in the Bering Sea, Gulf of Anadyr, or Karaginsky Bay. During the summer, they rest on and feed near terrestrial haul-out sites. The four most common haul-out sites in Alaska—Round Island, Cape Pierce, Cape Newenham, and Cape Seniavin—are in Bristol Bay. In addition, walruses haul out on the Punuk Islands near St. Lawrence Island and, in recent years, have been increasing their use of Hagemeister Island in Bristol Bay. Haul-out patterns are changing with climate change. In 2008 large numbers of walruses used Little Diomede whereas only small numbers had used this site previously. Also, since 2007 walruses have intermittently hauled out in large numbers on the northwestern coast of Alaska. During the fall, walruses move south with or ahead of the advancing pack ice, sometimes in herds of thousands as they pass through the Bering Strait and into the northern Bering Sea.

Status and trends: The abundance of the Pacific walrus population before commercial hunting began is uncertain but may have been between 200,000 and 300,000. Pacific walruses were subject to low levels of commercial hunting from the mid-17th century until 1867. Subsequent to the United States' purchase of Alaska, cycles of intensive commercial exploitation began. This commercial exploitation caused large fluctuations in walrus abundance over the next century (Fay 1982). By the late 1800s, severe declines in walrus numbers contributed to widespread famine and starvation in Native populations (Allen 1895). Although walrus numbers recovered to some extent, 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 between 50,000 and 100,000 animals (Fay 1982). In the 1960s, the Soviet Union and the State of Alaska independently implemented conservation measures to protect Pacific walruses and the population rebounded. In 2006 the Fish and Wildlife Service, the U.S. Geological Survey, the Russian State Engineering Institute of Fisheries (Giprorybflot), and the Chukotka Department, Pacific Scientific Research Institute of Fisheries and Oceanography (Chukot – TINRO), conducted the most recent survey of the population using newly developed aerial census techniques. The Fish and Wildlife Service reported the population estimate for the surveyed area as 129,000 with an extremely wide 95 percent confidence interval of 55,000 to 507,000 (Speckman et al. 2011). These figures were not adjusted to provide an overall abundance estimate for the full range of Pacific walruses, including two unsurveyed areas where walruses normally occur, and are therefore thought to under-represent the true population size. This 2006 estimate and the previous walrus population estimates cannot be compared meaningfully, and therefore it is not possible to reach any conclusions on population trends between the 1950s and the present day.

The effects of climate change and the need for listing: Reductions in summer sea ice habitat have been driven largely by persistent warming over the last 30 years, and this warming is projected to continue (Jeffries et al. 2012), posing a threat to Pacific walruses. These animals, especially mothers and their young, require resting habitat, either suitably thick sea ice or land near feeding areas (Figure II-18). Changes in the timing of sea ice break-up and forma-

Figure II-18. A walrus herd resting on and swimming around a chunk of pack ice during the spring break-up in the Chukchi Sea, off the National Petroleum Reserve, Alaska (Photo courtesy of Steven Kazlowski, Minden Pictures)

tion have large effects on the distribution and movements of walruses.

For the first time in recorded history in 2007, and in several subsequent years, the summer sea ice retreated north of the continental shelf in the Chukchi Sea. As a consequence, large numbers of walruses came ashore for the first times in recent memory on the northwestern coast of Alaska. This new large-scale use of land haul-outs suggests that the walruses may face increased energy expenditures to reach offshore feeding grounds, which may have an impact on their body condition and subsequent survival. Their presence in large concentrations may deplete the benthic food supplies that are within reach of the haul-out areas with consequences for the long-term sustainability of such haul-outs and for other species. In addition, when hauled out on land, walruses are more vulnerable to disturbance and, if disturbed, more prone to injury or death from trampling. The risk of injury, which is particularly high for calves, can be greatly exacerbated if the animals are startled by human activities or predators and stampede toward the water.

In an effort to reduce the risk of stampeding, in 2008 the Eskimo Walrus Commission passed a resolution to limit disturbance of walruses at land haul-outs. In 2009 walruses again hauled out in large numbers along the coasts of northern Alaska. At Icy Cape, Alaska, at least 131 calves were found dead, presumably due to a stampede, a week or two fol-

Table II-8. Combined U.S. and Russian catch of Pacific walruses, 2004 to 2012. (Source: Fish and Wildlife Service)

Year	Number Landed U.S.	Standard Error of Number Landed U.S.	Number Landed Russia	Total Number Struck and Lost	Estimated Total Number Removed	Standard Error of Estimated Total Number Removed
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	1,240	124	NA[a]	898	2,138	213
2012	1,626	119	NA[a]	1,176	2,802	206

[a] Russian data have not been collected since 2010.

lowing the haul out of 3,000 to 4,000 animals. The Fish and Wildlife Service and the Eskimo Walrus Commission continue to work with communities in Alaska to prevent such occurrences by avoiding activities that might disturb walruses hauled out on land. Additionally, the Federal Aviation Administration has issued advisories to pilots and closed airspace over land haul-out areas to minimize the possible impact on walruses.[43] These efforts appear to be working as stampede-related mortality has been reduced in recent years.

In 2012 the sparse ice that remained in the eastern Chukchi Sea into the autumn allowed walruses to remain offshore without the need to rest on land. The detailed movements of satellite-tagged walruses in 2012 remain to be analyzed, but initial visual inspection[44] of the data, National Marine Fisheries Service aerial surveys, and local observations of hunters found no evidence of walruses hauling out along the coast, particularly at Point Lay, in late summer 2012.

Offshore foraging movements of walruses have also been monitored by satellite telemetry. Data collected from 251 walruses (mostly females) between 2008 and 2011 revealed that summer foraging was concentrated offshore in the northeastern Chukchi Sea, particularly near Hanna Shoal, but that due to the absence of sea ice over the continental shelf from September to October, walruses foraged in nearshore areas off northwestern Alaska as well as in offshore areas (Jay et al. 2012). Some of these nearshore areas are not known to be rich in preferred walrus prey. It remains unclear whether walruses are able to consume enough in these areas alone or need to undertake longer migrations to more productive foraging areas farther offshore to meet their energy needs (Jay et al. 2012).

The Center for Biological Diversity petitioned the Fish and Wildlife Service in February 2008 to list the walrus under the Endangered Species Act on the basis of the risks posed to walruses by climate change. On 10 September 2009 the Fish and Wildlife Service recognized 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 listing the Pacific walrus as threatened. 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" 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 21 November 2012 the Fish and Wildlife Service published a review of native species that are candidates for listing as endangered or threatened (77 Fed. Reg. 69994). At the end of 2012 the Pacific walrus remained a candidate species with a relatively low listing priority (48 Fed. Reg. 43105; September 21, 1983, Recovery Priority Guidelines). Under a settlement agreement entered into by the Fish and Wildlife Service and WildEarth Guardians as well as the Center for Biological Diversity in 2011 involving a backlog of hundreds of listing proposals, the Service agreed either to issue a proposed listing rule or make a determination that the Pacific walrus does not qualify for listing in 2017 and to make a final determination in 2018.

Subsistence harvests: For several thousand years, Native communities in Alaska and Russia have relied on the Pacific walrus as a vital economic and cultural resource. Natives have depended, and continue to depend, on meat, ivory, and other walrus parts for food and for meeting other subsistence needs, including the ability to produce handicrafts. In modern times, ivory carvings have become a particularly important source of income in some villages. Climate change has an impact not just on the animals hunted for subsistence but also on other aspects of subsistence practices. For example, in 2012 warming temperatures led to the thawing of ice cellars in Point Hope, Alaska, raising concerns about the health risks of consuming meat that was stored in those cellars and posing a new threat to the use of walruses as a resource by Native communities (Eilperin 2012).

The Marine Mammal Protection Act of 1972 included exemptions to the moratorium on taking to allow Alaska Natives to continue harvesting marine

43 http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/fs/alaskan/advisories/walrus/

44 http://alaska.usgs.gov/science/biology/walrus/2012animation.html

mammals for subsistence purposes or for creating and selling authentic handicrafts and clothing, provided that the take is not wasteful. Currently, the Fish and Wildlife Service and the Eskimo Walrus Commission work with Native communities to monitor the subsistence hunt, collect biological samples from animals taken, and conduct a statutorily required ivory tagging program.

As part of the Walrus Harvest Monitoring Project, a Fish and Wildlife Service employee aided by volunteer residents from the communities of Gambell and Savoonga record the number of walruses taken and collect biological samples during a short period (about four weeks) in the spring. The purpose of this project is to improve knowledge concerning the walruses taken. Because the kills of some walruses (including calves) are not reported, the Service must use correction factors to estimate the total number of walruses removed from the population by hunting. This project also provides data used to calculate those correction factors.

Hunters shoot but fail to retrieve some walruses. Fay et al. (1994), using data collected between 1952 and 1972, estimated that 42 percent of walruses shot were not recovered. The Fish and Wildlife Service still uses that value to correct for struck and lost animals although its accuracy is uncertain, particularly given recent ice conditions and changes in hunting practices and equipment. The total estimated annual takes by Russians and Americans from 2004 to 2012 are given in Table II-8. The numbers taken in recent years are about half of what were taken in the mid-1980s. This apparent change could reflect a shift in hunting practices, a purposeful reduction in the catch, a decline in the walrus population, changes in weather and migration patterns that affect hunting success, or some combination of these factors.

Stock assessment report: As reported in the Commission's 2010–2011 report, the Fish and Wildlife Service completed its most recent stock assessment report for the Pacific walrus on 30 December 2009.[45] This had not been updated at the time of this report.

45 alaska.fws.gov/fisheries/mmm/stock/final_pacific_walrus_sar.pdf

Cook Inlet Beluga Whales *(Delphinapterus leucas)*

The Cook Inlet population comprises one of five stocks of belugas that occur in U.S. waters. Mitochondrial DNA analysis confirms that this geographically isolated population 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 overhunting. Given their proximity to Anchorage, Alaska's largest urban area, belugas in Cook Inlet are potentially affected by a variety of human activities.

National Marine Fisheries Service analyses of sightings in Cook Inlet over the past 30 years indicate that the stock's summer range has contracted substantially over that period. Compared with 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, the 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.

The most recent population estimate, based on aerial surveys conducted in 2012, is 312 whales (CV = 0.13) (Hobbs et al. 2012). This is somewhat higher than the 2011 estimate of 284 but lower than the 2010 estimate of 340 whales. These differences are not statistically significant and likely are due to variability in the estimation process rather than to annual fluctuations in population size (NMFS 2012). Based on average counts from the last three years, the Service has estimated the current abundance for the stock at 315 (CV = 0.13) (NMFS 2012).

Endangered Species Act listing: In 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 overhunting was the primary threat to the stock. Hunting was addressed when regulations were established in 1999. Contrary to the Service's expectations, however, and despite the fact that subsistence hunters are

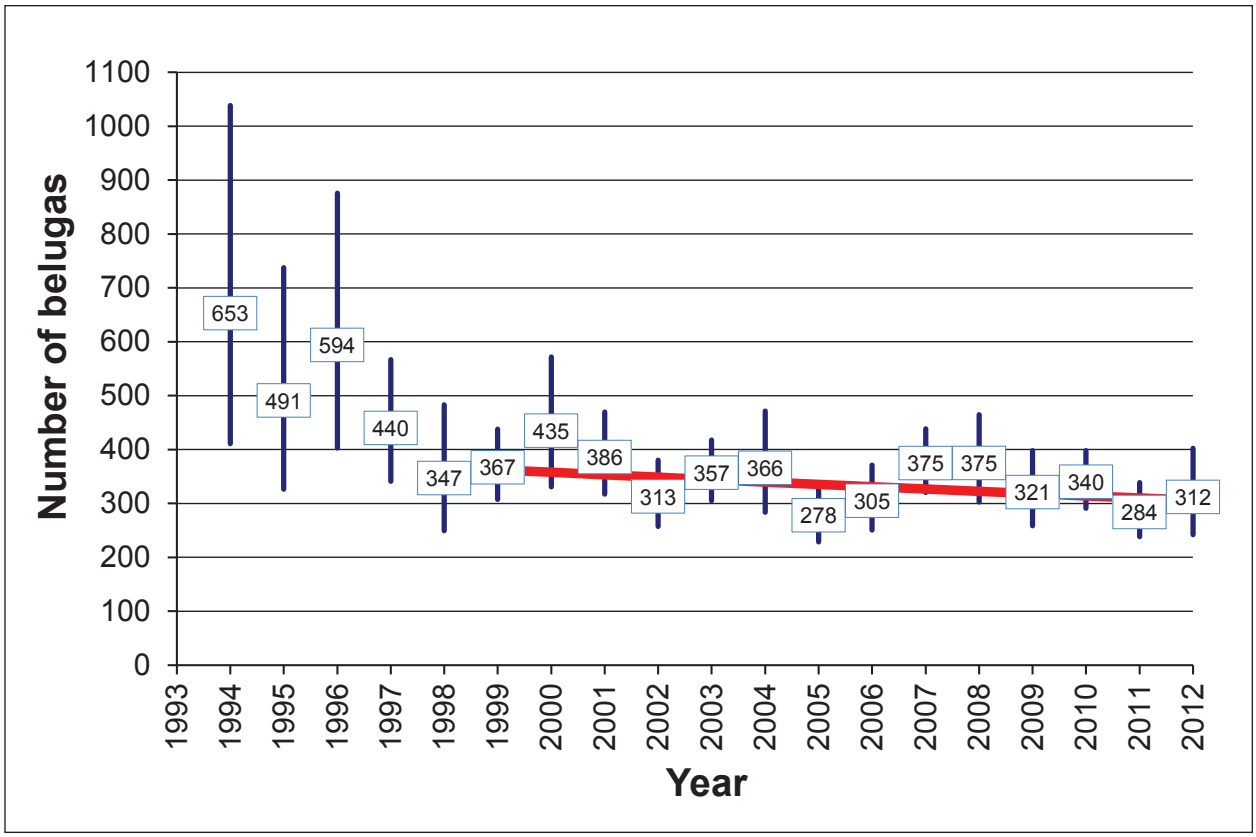

Figure II-19: Annual abundance estimates of beluga whales in Cook Inlet, Alaska 1994–2012. Vertical bars depict 95 percent confidence intervals. Rate of decline from 1999–2012 (red trend line) has been -1.3 percent per year (SE = 0.8 percent). (Figure source: R. Hobbs, National Marine Fisheries Service)

reported to have taken only five whales in the past decade, the stock has continued to decline by an average of 1.3 percent per year since 1999 although the trend line is not statistically different from zero (Hobbs et al. 2012).[46] Figure II-19 illustrates the stock's trend from 1994, when the Service initiated its monitoring program, to 2012 (Hobbs et al. 2012).

In light of the stock's apparent trend and unanswered questions about the cause or causes of the observed decline, the Marine Mammal Commission wrote to the National Marine Fisheries Service in 2006 to recommend that the Service reconsider listing the stock under the Endangered Species Act. 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, and consider using the emergency listing provisions of the Endangered Species Act as an interim measure. The Service instead chose first to evaluate the sufficiency of available data and study the most recent abundance estimates. After conducting its review, the Service found the new information was consistent with previous analyses indicating that the stock was declining and on 22 October 2008 it published a final rule listing the Cook Inlet beluga as an endangered species (73 Fed. Reg. 62919).

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

46 http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/management.htm.

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 of and comment on documents and data relied on in the final listing rule but not available at the time the proposed rule was published.

On 4 June 2010 the state filed its lawsuit in federal court. It asked the court to vacate the Service's listing decision for alleged violations of the Administrative Procedure Act and the Endangered Species Act (*Alaska* v. *Lubchenco*, 825 F.Supp.2d 209 (D.D.C. 2011)). The state claimed that the Service had not properly weighed the relevant statutory criteria and had otherwise failed to abide by the requirements for making a listing determination. The district court issued its opinion on 21 November 2011, finding that the Service had 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 court noted that judicial review of agency decisions under the Endangered Species Act is governed by applicable Administrative Procedure Act standards set forth at 5 U.S.C. § 706(2)(A)—a court may set aside an agency action only if it can be demonstrated to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." That is, the court may not substitute its own judgment for that of the agency but instead must determine whether the agency considered the relevant factors and established a clear, rational link between these factors and the decisions made. The state had 60 days in which to file an appeal of the district court ruling but did not do so. As a result, the district court's ruling stands and the Cook Inlet beluga whale remains listed as an endangered species.

On 15 May 2012 the Cook Inlet beluga whale again became the subject of litigation—this time from a lawsuit filed by Alaska Natives and environmental groups challenging the Service's decision earlier that month to issue an incidental harassment authorization (IHA) for oil and gas exploration activities in Cook Inlet (*Native Village of Chickaloon* v. *National Marine Fisheries Service*). The Marine Mammal Commission had commented to the Service on the IHA request in 2011, recommending that the Service defer issuance of the IHA until it could, with reasonable confidence, support a conclusion that the proposed activities would have only a negligible impact on the Cook Inlet beluga whale population.[47] The IHA applicant, Apache Alaska Corporation, had acquired more than 300,000 acres of oil and gas leases in Cook Inlet with the primary objective to explore and develop oil fields. Apache planned to conduct exploration activities using a phased 3D seismic survey program throughout Cook Inlet for a period of three to five years (77 Fed. Reg. 27721). The plaintiffs cited concerns over the potential impact on the endangered Cook Inlet beluga whale population, arguing that the proposed activities would have more than a negligible impact on the stock and an adverse impact on Native communities that traditionally have depended on beluga whales for subsistence and which currently are not allowed to hunt them due to the population's small size and decreasing trend (see 'Regulation of subsistence hunting' below). The Commission expressed similar reservations over energy development in Cook Inlet in a 7 May 2012 letter to the Bureau of Ocean Energy Management, recommending that the agency defer a proposed special-interest lease sale that would expand oil and gas activity within the Cook Inlet planning area (See Appendix A). The court was expected to schedule oral argument of the case early in 2013.

Designation of 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. 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

47 http://www.mmc.gov/letters/letters_11.shtml.

for conservation of the species. 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[48] 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 deferred designating critical habitat to a separate rulemaking.

The Service published a proposed rule to designate critical habitat for Cook Inlet beluga whales on 2 December 2009 (74 Fed. Reg. 63080) and a final designation rule on 11 April 2011 (76 Fed. Reg. 20180). The Service designated all areas within Cook Inlet north of 60°15′N latitude as critical habitat with the exception of the area around the Port of Anchorage and the Eagle River Flats Range on Fort Richardson and military lands of Joint Base Elmendorf-Richardson. The designated area includes the Susitna River delta, Chickaloon Bay, Turnagain Arm, and Knik Arm and contains shallow tidal flats, river mouths, and estuarine habitat that are particularly important to belugas for foraging and nursing. The Service also designated as critical habitat nearshore areas farther south along the west side of the inlet and within Kachemak Bay on the east side of the lower inlet. The designation did not include any areas historically, but not currently, inhabited by beluga whales. The final designation encompasses a total of 7,809 km^2 (3,019 mi^2) of marine habitat (Figure II-20).

Development of a research and recovery plan: Once a species is listed under the Endangered Species Act, the listing agency is required to prepare a recovery plan (unless it determines that such a plan will not promote the conservation of the species). 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 is to include (1) a description of site-specific management actions necessary to meet the recovery goal, (2) objective, measurable criteria that, when met, would warrant delisting, 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 representatives of public and private agencies and institutions and other qualified persons to assist in the development of a recovery plan.

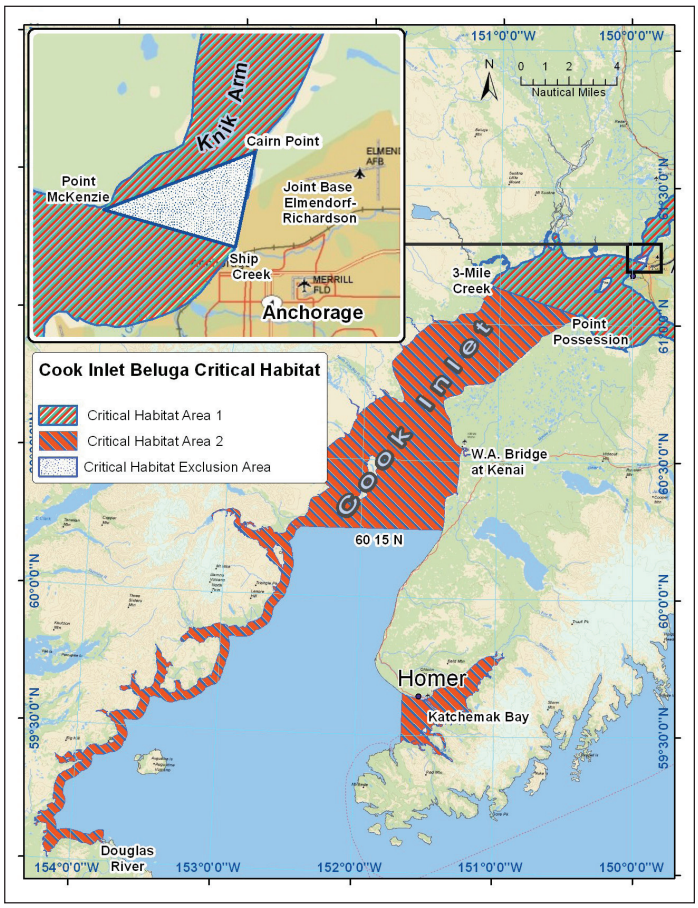

Figure II-20. Areas designated by the National Marine Fisheries Service in April 2011 as beluga whale critical habitat. Area 1 is particularly important for foraging and as nursery sites. Area 2 provides important feeding and transit areas in the fall and winter. An area around the Port of Anchorage was excluded from the designation because of the importance of that area for security reasons. (Map source: National Marine Fisheries Service)

48 50 C.F.R. § 424.12(b).

On 28 January 2010 the Service announced its intention to prepare a recovery plan and solicited information on Cook Inlet beluga whales and their habitat for the purpose of preparing the plan (75 Fed. Reg. 4528). Two months later the Service established the Cook Inlet Beluga Whale Recovery Team with the sole mandate to develop a recovery plan. The Commission wrote to the Service on 29 March 2010 supporting development of a recovery plan and recommending that the Service use the conservation plan developed in 2008 as a template and a guide for the Service's research and management efforts in the interim. The Commission believed that the Service should give high priority to developing and implementing a research and recovery program commensurate with the population's small size, endangered status, and declining trend.

In 2010 and 2011 the Commission continued to provide oversight and assistance to the Service in its development of a research program that could identify and address the threats impeding recovery of the Cook Inlet population. In 2010 the Commission requested detailed information from the Service on the amount of funding allocated for Cook Inlet beluga research over the previous five-year period, specific projects undertaken, other recovery actions funded, and any planned future research activities and their anticipated costs for fiscal years 2011 through 2013.[49] The Service provided the requested information, explaining that research funding had been variable during that period and peaked at just over $2 million in 2007. The Commission sent a follow-up letter to the Service on 3 October 2011, urging it to continue and expand research activities such as photo-identification, aerial surveys, and sampling of dead, stranded whales in order to continue long-term monitoring and identify factors impeding population growth. The Commission also advised the Service to take a cautious approach in initiating a proposed tagging study, which would employ an invasive research technique that could be detrimental to the population.[50] The Service responded that it agreed for the most part with the Commission's recommended research priorities but noted that it would also have to consider practical constraints on such efforts, most notably the associated costs.

The Service provided an update on its conservation and management activities related to Cook Inlet beluga whales at the Commission's 2012 annual meeting in Anchorage, Alaska. Among other things, representatives of the Service discussed the status of the recovery team and the Service's strategy for investigating the causes behind the Cook Inlet population's flat or declining growth trend. The Service reported that it planned to continue carrying out an abundance survey of the population each June as well as an annual August calf survey. Contingent on the availability of funds, the Service also planned to (1) conduct a population viability analysis of the Cook Inlet population, (2) conduct a Bristol Bay tagging and health assessment project that had originally been planned and partially funded for 2011 but was postponed due to funding issues, and (3) collect biopsies from Cook Inlet belugas to study genetics within the population, identify individuals, and gain insights on diet through stable isotope analyses. Because much of the Service's funding is spent on aerial surveys, which are important for obtaining accurate information on the stock's abundance and trends, the Service stated that progress on other research priorities would be limited by the amount of funding available.

The Service and the recovery team's chair provided an update on the team's progress in developing a draft recovery plan, including interim recommendations for research needed to better understand the population's lack of recovery. The team had discussed the possibility of reducing aerial surveys to once every two or three years to free up funds that would allow other studies to progress more quickly. However, the team felt strongly that, in light of evidence of a two- to three-year cycle in the distribution patterns of belugas, coupled with a concern that some of the statistical power of the surveys would be lost, along with the insights into annual birth and death rates that they provide, annual surveys should continue. The team announced that it would continue to develop the research section of the plan, including analyses of data gaps and priorities. As of the end of 2012 the Service had yet to release a draft recovery plan for public review.

49 http://www.mmc.gov/letters/pdf/2010/ci_beluga_funding_62810.pdf.

50 http://www.mmc.gov/letters/pdf/2011/cook_inletbeluga_10311.pdf.

Regulation of subsistence hunting: Section 101(b) of the Marine Mammal Protection Act allows Alaska Natives to take marine mammals for subsistence or for making and selling handicrafts, provided that the taking is not accomplished 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. This overhunting and the 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 table that sets forth the allowable take of Cook Inlet belugas according to estimated abundance levels and growth rates, subject to adjustments based on whether observed mortality from sources other than subsistence hunting exceeds the expected number of deaths (natural mortality) for a stock of its size. No hunting is allowed if the average stock abundance over the previous five-year interval is less than 350. Once the average reaches 350, a limited amount of hunting would be allowed (e.g., one strike per year under a low or intermediate estimated growth rate). The number of allowed strikes would increase under other scenarios to a maximum of 32 strikes over five years at a stock level of 700 or more animals, but only if the stock's observed or estimated growth rate is high (50 C.F.R. § 216.23(f)(2)(v)). Because the average abundance estimate over the previous five years was below 350 (the most recent five-year population average was 326 whales), no hunting was allowed in 2012.

Northern Sea Otters in Alaska (*Enhydra lutris kenyoni*)

Sea otters once ranged from Hokkaido, Japan, through coastal areas of Russia (Kurile Islands, Kamchatka, Commander Islands) and Alaska (Aleutian Islands, Alaska Peninsula), and south along the western coast of North America to Baja California, Mexico, with the global population estimated to be between 150,000 and 300,000 animals (Kenyon 1969, Johnson 1982). During the 1700s and 1800s, the global fur trade decimated sea otter populations throughout their range, leaving behind only an estimated 2,000 individuals scattered across the species' original range, including several isolated populations in southwest Alaska along the Aleutian Islands (Kenyon 1969). After the International Fur Seal Treaty of 1911 banned the hunting of sea otters, the species began to recover and, by the 1960s, sea otters had reoccupied most of their former habitat in southwest Alaska.

Today northern sea otters in Alaska are managed as three separate stocks: southwest, south-central, and southeast. The geographic ranges of these stocks are delineated as follows: (1) the southeast Alaska stock ranges from Dixon Entrance to Cape Yakataga; (2) the south-central Alaska stock extends from Cape Yakataga to Cook Inlet, including Prince William Sound, the Kenai Peninsula coast, and Kachemak Bay; and (3) the southwest Alaska stock's range includes the Alaska Peninsula and Bristol Bay coasts and extends along the Aleutian, Barren, Kodiak, and Pribilof Islands (Figure II-21) (Gorbics and Bodkin 2001, U.S. Fish and Wildlife Service 2008). These delineations are supported by discontinuity in distribution, differences in contaminant loads, phenotypic differences, and differences in both mitochondrial and nuclear DNA.

The Fish and Wildlife Service has primary responsibility for the conservation and management of sea otters. Other agencies and groups, particularly the U.S. Geological Survey and Alaska Native organizations, assist with research and management activities. Research and management activities have focused on the southwest Alaska stock, which declined precipitously during the past three decades and is listed as threatened, and the southeast Alaska stock, which has grown in abundance over that same period and is having increasing interactions with commercial and subsistence fisheries.

Like all sea otters, northern sea otters in Alaska rarely occur in waters deeper than about 100 m although they occasionally cross deep channels between island groups. Adult males may move 400

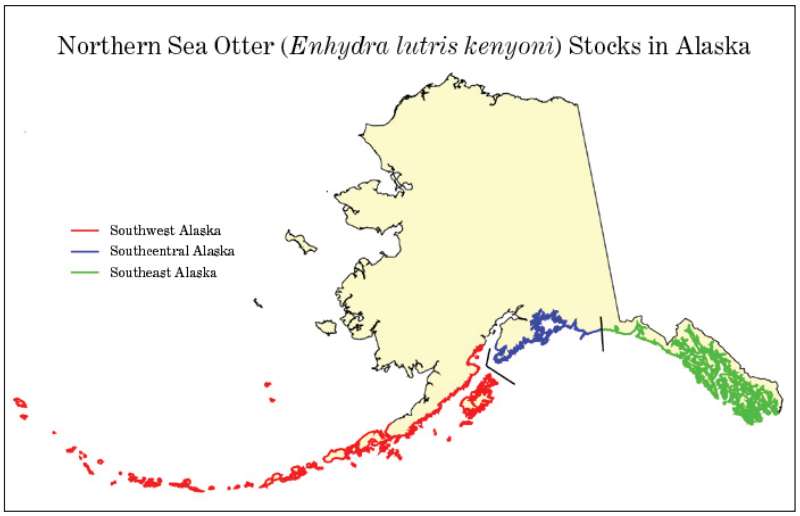

Figure II-21. Northern sea otter stocks in Alaska (Source: Fish and Wildlife Service).

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 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 fishes.

There were a number of issues and developments in 2012 relative to the southwest and southeast Alaska stocks in 2012 that are important to report here, but we are not aware of significant developments regarding the south-central stock in 2012 so do not discuss it further in this section.

Southwest Alaska stock: With the ban on commercial hunting of sea otters in 1911, sea otter populations in southwest Alaska began to recover and reoccupy their former range. By the 1980s an estimated 55,100 to 73,700 otters occupied southwest Alaska, and some biologists thought the population was approaching or had reached its pre-exploitation level of abundance (Calkins and Schneider 1985). However, the stock then plummeted over the next few decades, and surveys between 2000 and 2004 indicated the overall sea otter population in southwest Alaska had declined by more than 50 percent since the 1980s (Estes et al. 2005). The greatest declines were in the western Aleutian Islands and along the southern part of the Alaska Peninsula, with declines in the western and central Aleutians estimated at 63 percent (Estes et al. 2005, U.S. Fish and Wildlife Service 2008). Sea otters may have disappeared entirely around some small islands in the central Aleutians. The most recent population estimate published by the Fish and Wildlife Service is in the 2008 stock assessment report, which gives a best estimate of 47,646 animals and calculates the minimum population size for the entire southwest Alaska stock at just 38,703 animals (U.S. Fish and Wildlife Service 2008).

The cause of the decline is uncertain (e.g., Kuker and Barrett-Lennard 2010), but available evidence points to increased mortality from one or more sources rather than diminished reproduction. The suspected sources include predation by killer whales and/or sharks, starvation, disease, oil spills, incidental take in commercial fisheries, subsistence hunting, poaching, and intra-specific aggression. The leading hypothesis is an increase in predation by killer whales (Estes et al. 1998) although what may have caused such an 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 anthropogenic factors.

In 2005 the Fish and Wildlife Service listed the southwest Alaska sea otter stock as threatened under the Endangered Species Act, and in 2006 the Service convened a Southwest Alaska Sea Otter Recovery Team, composed of representatives from federal and state agencies, Alaska Native organizations, and the academic community, to assist in drafting a recovery plan. Because the southwest stock exhibited drastic variations in population decline across its range, the team proposed dividing the stock into five separate management units, and in 2009 the Service designated critical habitat for these management units (74 Fed. Reg. 51988). In October 2010 the Service released for public review a draft recovery plan for the southwest Alaska distinct population segment of the northern sea otter (75 Fed. Reg. 62562). The draft plan outlined three main objectives, each of which was linked to explicit criteria to determine if the

overall recovery goals have been met, based on the overall status of each of the five separate management units, and therefore whether the stock could be delisted. The three objectives were (1) achieve and maintain a self-sustaining population of sea otters in each designated management unit, (2) maintain enough sea otters to ensure that they are playing a functional role in their nearshore ecosystem, and (3) mitigate threats sufficiently to ensure persistence of sea otters. The draft plan also emphasized the importance of monitoring and modeling the southwest Alaska distinct population segment and its kelp forest habitat, particularly for the western and eastern Aleutian management units, and 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 highlighted the need 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.

The Commission provided several recommendations to the Service on its draft recovery plan, notably suggesting that the Service should provide an estimate of the time and cost required for the population to recover to the point where it could be delisted and revise the plan to specify the frequency of population monitoring surveys for each management unit. The Commission also recommended that the Service provide more detail on oil spill response plans and better describe and establish priorities among proposed scientific research projects on sea otters and predation by killer whales and other predators.[51] At the end of 2012 the Service was still preparing the final recovery plan.

Southeast Alaska stock: In the 18th and 19th centuries, sea otters were extirpated from their range in southeast Alaska. To restore otter populations within this portion of their historical range, during the 1960s the State of Alaska translocated about 400 sea otters from some of the remnant colonies in the Aleutian Islands and Prince William Sound to six sites in southeast Alaska. In 2011 the Fish and Wildlife Service conducted an aerial survey of the northern portion of the southeast Alaska population, the first survey in this region since 2002. Data from this survey indicated that the northern portion of the southeast Alaska stock had grown at a rate of 4 percent annually. A 2010 survey of the southern portion of the southeast Alaska range found that the portion of the sea otter population there had increased at a rate of around 12 percent per year. Similarly, the range of sea otters in southern southeast Alaska has expanded much more than that of sea otters in northern southeast Alaska. The overall population estimate for southeast Alaska sea otters increased from 10,563 in 2002 to around 20,000 in 2011 but is still believed to be below carrying capacity. Overall densities of sea otters per square kilometer in that region are far below the densities observed in other parts of Alaska (Gill et al. 2012).

Interactions with fisheries: The increasing population of sea otters in southeast Alaska has triggered concerns that otters are having significant adverse effects on commercial and subsistence fisheries, particular those fisheries that target red sea urchins, Dungeness crabs, California sea cucumbers, and geoduck clams. Revenues from the geoduck and sea cucumber dive fisheries have increased dramatically in recent years, fueled by increasing demand from Asian markets, and the southeast Alaska dive fishery produced wholesale gross revenues of $16.7 million in 2010 (McDowell Group 2011). One view of the possible effect of sea otter consumption of commercially harvested species was addressed in an economic analysis funded by the Southeast Alaska Regional Dive Association (McDowell Group 2011). That study estimated the difference between realized and hypothetical potential revenues of southeast Alaska commercial landings due to competition with sea otters at approximately $12.9 million annually, with 39 percent of dive fishery harvest areas either affected by sea otters or closed to fishing to protect sea otters.

At the Commission's 2012 annual meeting in Anchorage, Alaska, the Fish and Wildlife Service presented preliminary results from studies of sea otter foraging in southeast Alaska. They found that 57 percent of the biomass consumed by sea otters was made up of commercial species, with two-thirds of

51 More details about the Commission's review can be found in its 2010–2011 annual report to Congress, available at http:// www.mmc.gov/reports/annual/welcome.shtml

that being red sea urchins. However, when one area with extremely high predation of red sea urchins was excluded from the data, commercial species made up only 19 percent of sea otters' overall diet. Sea otters were found to forage more on commercial species at the edges of their range, while consuming far fewer commercially exploited prey at the core areas of their range (Gill et al. 2012). To better understand the impact of sea otter predation on commercial shellfish species, the Service began a two-year study in May 2011 in which it tagged 30 otters (16 male and 14 female) with radio transmitters to study their movements, foraging behavior, and colonization of habitat along the margins of their range. The Service and representatives from the fishing industry have formed a stakeholder working group to address management and resource conflict issues surrounding sea otters in southeast Alaska.

Harvest and sale of "significantly altered" sea otter handicrafts: Section 101(b) of the Marine Mammal Protection Act authorizes any Indian, Aleut, or Eskimo who resides in Alaska and dwells on the coast of the North Pacific Ocean or the Arctic Ocean to take marine mammals for subsistence purposes or for purposes of creating and selling authentic Native articles of handicrafts and clothing, provided that the taking is not done in a wasteful manner. The Act provides a definition of what constitutes authentic Native articles of handicrafts and clothing and provides a partial list of the types of activities considered to be traditional Native handicrafts (weaving, carving, stitching, sewing, lacing, beading, drawing, and painting). The Fish and Wildlife Service has provided further interpretation of the Act's requirements through regulations (50 C.F.R. §§ 18.3 and 18.23) that define authentic Native articles of handicraft and clothing to mean items that are (a) composed wholly or in some significant respect of natural materials and (b) are significantly altered from their natural form and are produced, decorated, or fashioned in the exercise of traditional Native handicrafts without the use of mass copying devices. Modern devices such as sewing machines may be used so long as no mass-production industry is involved. The statutory provisions and implementing regulations are designed to draw a clear distinction between harvesting to create and sell traditional handicrafts to maintain cottage industries on the one hand and the commercial exploitation of marine mammals on the other.

Members of the Alaska Native community and others have voiced concerns over the Service's interpretation of the term "significantly altered" because it is vaguely defined. The lack of clarity may be causing some Native Alaskans to forego hunting and handcrafting opportunities and is complicating enforcement.[52] Native groups have complained that federal enforcement officers do not apply consistent definitions of the term and that some officers interpret the rules to allow only traditional handicraft items to be made and sold, not allowing modern clothing products that incorporate zippers or commercial sewing equipment. At the Commission's 2012 annual meeting in Anchorage, Alaska, Fish and Wildlife Service Office of Law Enforcement representatives reported that in 90 percent of the instances in which questions arise, an officer can tell whether an item has been sufficiently altered from its original form. However, in some instances, law enforcement officers must make a judgment call that is less clear-cut. This ambiguity leads to confusion on the part of Native hunters and handicraft producers, enforcement officials, and the general public. To address this problem, the Fish and Wildlife Service began working with Alaska Native organizations, the Marine Mammal Commission, and others to develop clearer guidance on how the "significantly altered" requirement should be applied to sea otter handicrafts. The Fish and Wildlife Service convened a workshop in Anchorage in October 2012, primarily to solicit input from the Native community on possible clarification of "significantly altered." The discussions at that workshop prompted the Indigenous People's Council for Marine Mammals (IPCoMM) to offer a proposed definition:

> A sea otter will be considered "significantly altered" when it is no longer recognizable as a whole sea otter hide, and has been made into a handicraft or article of clothing as is identified below:
>
> 1. A tanned, dried, cured, or preserved sea otter hide, devoid of the head, feet, and tail, which includes any of the following

52 See, e.g., http://alaska.fws.gov/fisheries/mmm/current.htm

but is not limited to weaving, carving, stitching, sewing, lacing, beading, drawing, painting, other decorative fashions, or made into another material or medium;

2. Tanned, dried, cured, or preserved sea otter head, tail, or feet, or other parts devoid of the remainder of the hide which includes any of the following but is not limited to weaving, carving, stitching, sewing, lacing, beading, drawing, or painting, other decorative fashions, or made into another material or medium.

3. All other parts; teeth, skull, bones, oosik, etc., which can be used in any of the following ways: weaving, carving, stitching, sewing, lacing, beading, drawing, painting, other decorative fashions, or transformed into another material or medium.

At the end of 2012 the Fish and Wildlife Service was in the process of reviewing the definition proposed by IPCoMM. Drawing on that proposal, the Service had decided to draft a more thorough explication of the issues and the relevant statutory and regulatory provisions, which would be circulated for public comment. Publication of that document is expected early in 2013.

In addition, Congress has considered legislation that would address the fisheries competition issue by lifting limits on the commercialization of sea otter products, including Native handicrafts. In 2011 members of the House and Senate introduced legislation (H.R. 2714 and S. 1453) that would amend the Marine Mammal Protection Act to allow the transport, purchase, and sale of pelts of sea otters from the south-central and southeast Alaska populations taken for subsistence purposes. These bills also would allow the transport, purchase, sale, or export of any handicraft, garment, or art produced from these pelts regardless of whether the product (a) is traditional or contemporary or (b) is or is not altered significantly. The House Subcommittee on Fisheries, Wildlife, Oceans, and Insular Affairs held a hearing to discuss the merits of the bill in October 2011, and the Commission provided testimony at the hearing. The Commission's testimony focused on the fact that the proposed changes to the Act would confound law enforcement efforts to distinguish between legal and illegal uses of sea otter pelts and would undermine existing Alaska Native cottage industries that produce and sell authentic Native articles of handicrafts and clothing. No further actions were taken in 2011 on either the Senate or House versions of the bill, and no new legislation on this issue was introduced in 2012.

Steller Sea Lion (*Eumetopias jubatus*)

Steller sea lions occur from central California north along the West Coast of North America, westward through the Gulf of Alaska and the Aleutian Islands to the Kamchatka Peninsula in Russia, and southward from there along the Kuril Islands to northern Japan (Loughlin 2009, Gelatt and Lowry 2012). In the United States, Steller sea lions are currently managed by the National Marine Fisheries Service as two separate populations: a western population that occurs from the central Gulf of Alaska through the Aleutian Islands (west of 144°W) and an eastern population that occurs from central California northward and throughout southeast Alaska (east of 144°W) (Figure II-22). The western population has declined by more than 80 percent since the 1970s, and in 1990 the entire species was listed as threatened under the Endangered Species Act. In 1997 the National Marine Fisheries Service revised this designation by officially recognizing the western and eastern stocks as two distinct population segments, changing the listing status of the western distinct population segment to endangered and leaving the status of the eastern distinct population segment unchanged as threatened. In contrast to the western population's continued decline, the eastern population 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 dramatic decline have been the subject of considerable debate over the years. A number of factors are known to have contributed to the decline, including bycatch in commercial fisheries, illegal shooting by fishermen and others, the killing of 45,000 pups for commercial sale of pelts between the mid-1960s and early 1970s,

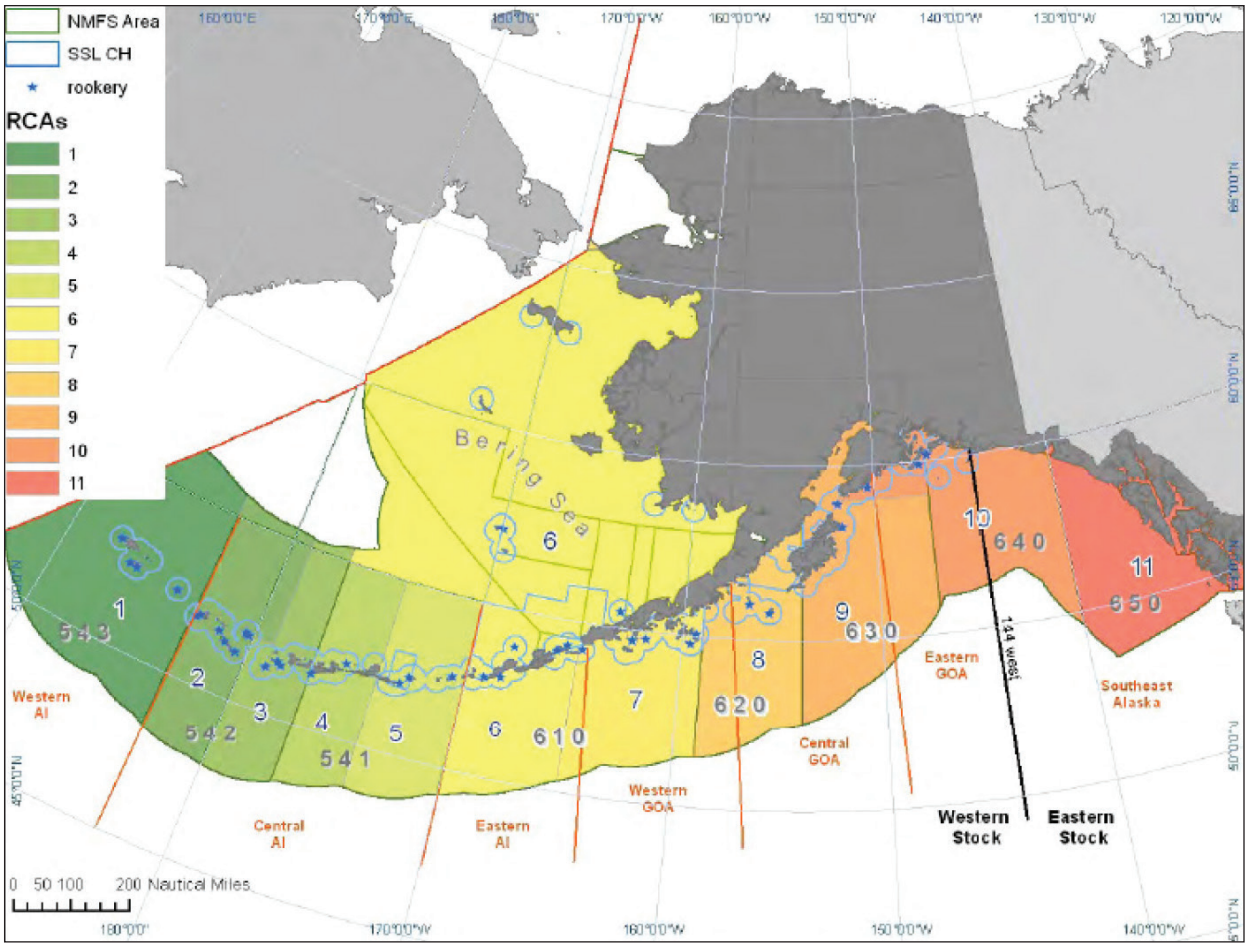

Figure II-22: Locations of important Steller sea lion rookeries and haul-out areas in relation to National Marine Fisheries Service groundfish fishery management areas in Alaska. Steller sea lion rookeries found within statistical areas 543, 542, and 541 have experienced some of the greatest population declines (NMFS 2010)

and subsistence harvests by Alaska Natives. However, these factors explain only a portion of the decline, and the debate over other possible causes has been intense. The leading hypotheses include direct and indirect effects of large-scale commercial fishing activity (e.g., prey depletion) in the Gulf of Alaska, large-scale changes in ocean conditions and regime shifts, and predation by killer whales. Because of the potential involvement of commercial fisheries, research on the decline of Steller sea lions has received more funding in past years than research on other endangered or threatened marine mammal species. Funding increased from about $3 million in 1998 to as much as $56 million in 2002 and 2003 (Weber and Laist 2007) although funding levels have declined sharply in recent years. Much of the earlier spikes in funding went toward various research initiatives, at one point funding more than 150 studies to examine everything from Steller sea lion physiology and foraging ecology to fish stock assessments and ecosystem dynamics. Despite that brief period of intensive research, controversy persists over the causes behind the western population's decline.

Recovery plan and critical habitat: In 1992 the National Marine Fisheries Service completed the first recovery plan for Steller sea lions. That plan became outdated over the next decade as the Service decided to treat the eastern and western populations as distinct population segments under the Endangered Species Act. The Service reconvened a recovery team in 2001 and released a revised draft recovery plan in 2006 that addressed both Steller sea lion distinct population segments. The new recovery plan identified three categories of threats to recovery: minor

threats (e.g., subsistence hunting, illegal shooting, entanglement in debris, disease, and disturbance from vessel traffic and scientific research activities), moderate threats (contaminants and incidental mortality in fisheries), and major threats (competition with fisheries, changing ocean conditions, and predation by killer whales). The new plan also outlined 78 different recovery actions that emphasized assessment of population status and vital rates, investigation of remaining threats, and implementation of corresponding conservation measures. Three elements were assigned particular importance: (1) maintaining current fisheries management measures, (2) taking an adaptive management approach by modifying fisheries conservation measures as more is learned about the effectiveness of tried measures and the nature of sea lion interactions with the fisheries, and (3) continued monitoring of sea lion status and investigation of threats. The Service released its final version of the revised recovery plan for the eastern and western distinct population segments of Steller sea lions in 2008**.**

On 27 August 1993 the Service 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 extending 3,000 feet seaward in federal and state waters from the perimeter of all terrestrial areas, and an aquatic area extending 20 nautical miles (nm) seaward from the perimeter of all major rookeries and haul-out areas west of 144°W longitude. Critical habitat in Alaska also included three special foraging areas: one in Shelikof Strait, another around Bogoslof Island, and one in the Seguam Pass area. Critical habitat for California and Oregon rookeries was designated only for the air zones and the aquatic areas extending 3,000 feet out to sea (58 Fed. Reg. 45269).

Protection measures: Steller sea lion protection measures have been in place to manage the Alaska groundfish fisheries since 1999 (64 Fed. Reg. 3437). These protection measures have been used to mitigate potentially adverse effects of fishing activity on Steller sea lion populations and their designated critical habitat, including effects of entanglement in fishing gear, disturbance, and competition for important prey species such as Atka mackerel (*Pleurogrammus monopterygius*), Pacific cod (*Gadus macrocephalus*), and walleye pollock (*Theragra chalcogramma*). The measures include fishery restrictions and closures to minimize the spatial overlap of fishing activity with important Steller sea lion foraging habitat and haul-out areas. Fish catch limits are also temporally dispersed over the year to avoid significant ecological impacts (e.g., competition for prey species) on Steller sea lions (77 Fed. Reg. 22750).

In April 2006 the Service's Alaska Region, Sustainable Fisheries Division, initiated a new Endangered Species Act section 7 consultation on the potential effects of Alaska groundfish fisheries on listed species and their designated critical habitat in the Bering Sea and Aleutian Islands management area. The new section 7 consultation was requested in consideration of new scientific information and changes in the fisheries since the previous biological opinion had been supplemented in 2003 (NMFS 2010). In August 2010 the Service released a draft biological opinion resulting from the reinitiated section 7 consultation. The biological opinion found that Steller sea lion protection measures implemented in the area were insufficient to prevent fishing activity from jeopardizing the continued existence of Steller sea lions or to avoid destroying or adversely modifying the species' critical habitat. As a result, the biological opinion proposed a reasonable and prudent alternative to existing protection measures, which would establish more stringent fisheries measures in areas where Steller sea lion population declines are highest—in this case for rookeries found within the fishery statistical areas 543, 542, and 541 in the Aleutian Islands subarea (Figure II-22). The protection measures are designed to minimize local competition between Steller sea lions and the Atka mackerel and Pacific cod fisheries in these areas, thereby improving prey availability and foraging success, and ultimately leading to increased sea lion adult survival and reproductive success.

The Commission provided comments on the draft biological opinion on 3 September 2010, recommending that the Service take steps to analyze and describe more fully the ecosystem-level effects of past and current fisheries harvest strategies in the Bering Sea and Aleutian Islands management area

on Steller sea lion foraging success and their habitat. Further information about these comments and recommendations can be found in the Commission's 2010–2011 report and on the Commission's website.[53]

To satisfy the requirements of the National Environmental Policy Act, the National Marine Fisheries Service prepared an environmental assessment meant to contain the information and provide the analysis necessary to determine whether the proposed protection measures for the Bering Sea and Aleutian Islands management area would require the preparation of an environmental impact statement. On 26 November 2010, the Service issued a Finding of No Significant Impact, concluding that, although the proposed actions would have an impact on participants in Bering Sea and Aleutian Islands fisheries, the actions overall would not have a significant impact on 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 and Aleutian Islands groundfish fisheries to ensure the fisheries do not jeopardize the western distinct population segment of Steller sea lions or adversely modify its critical habitat. The intent of the measures was to disperse fishing effort over time and space and thereby protect Steller sea lions from prey competition around important rookeries and haul-out areas.

Legal challenges to the protection measures: Following publication of the proposed interim final rule in December 2010, the state of Alaska and various fishing industry entities filed legal actions in the U.S. District Court, District of Alaska, challenging the rule and seeking injunctive relief against the proposed protection measures (*State of Alaska et al.* v. *Jane Lubchenco* 2012). The plaintiffs challenged the Service's final biological opinion and its reasonable and prudent actions, the finding of no significant impact resulting from the environmental assessment, and the interim rule restricting fishing activity. The plaintiffs moved for summary judgment, arguing that the Service's actions were substantively and procedurally flawed under the Administrative Procedure Act, the Magnuson–Stevens Fishery Conservation and Management Act, the Endangered Species Act, and the National Environmental Policy Act. On 2 February 2011 two non-governmental organizations, Oceana, Inc., and Greenpeace, Inc., filed a motion seeking to intervene in the case as defendants, which the court granted.

The court issued its decision on 19 January 2012, ruling against the plaintiffs on their claims that the Service's biological opinion and interim rule were flawed under the Endangered Species Act, the Administrative Procedure Act, and the Magnuson–Stevens Act. However, the court did rule in favor of the claim that the Service violated National Environmental Policy Act by failing to prepare an environmental impact statement and by not providing the public with sufficient information and opportunity to comment on the agency's decision-making process. In March 2012 the court remanded the matter to the Service, requiring the agency to prepare and circulate a draft environmental impact statement for public comment and provide meaningful responses to public comments on the draft. The Service was required to adhere to a mandated schedule in drafting and circulating the draft for public comment, with a final environmental impact statement due no later than 2 March 2014. Any final rule setting forth fishery management measures is to be in place by the 2015 fishing season. The court also directed the Service to provide quarterly status reports on its progress. The plaintiffs filed an appeal in June 2012, asking the court to vacate both the Service's interim final rule and biological opinion. The Ninth Circuit Court of Appeals held oral argument in the case in December 2012 and was expected to issue its opinion on the case sometime in 2013.

In the meantime, the Service has begun preparing the draft environmental impact statement as prescribed in the district court's decision. The Service published a *Federal Register* notice on 30 August 2012 soliciting public comment on the scope of the proposed statement. The Commission provided comments to the Service on 19 October 2012, recommending that it focus its required environmental impact statement on a full analysis of the effects of fisheries on Steller sea lions, including the effects of a fishing strategy based on maximum sustainable yield (MSY) that reduces fish target biomass by 60

53 http://www.mmc.gov/letters/letters_10.shtml

percent or more. The Commission letter expressed concern that the Service should reconsider its MSY-based fishery management strategy. Consideration of the full ecological consequences of fishery management is part of setting catch levels at MSY "as reduced by any relevant economic, social, or ecological factor." The Commission noted in its letter that the Service had not addressed fundamental questions regarding the potential effects of the Alaska groundfish fisheries on Steller sea lions, notably the potential impact of these fisheries changing the sea lions' prey field.

Delisting the eastern distinct population segment of Steller sea lions: In June 2010 the Service initiated a status review of the eastern population of Steller sea lions. Shortly thereafter, the Service received two petitions, one from the states of Washington and Oregon and one from the state of Alaska, to remove the eastern distinct population segment of Steller sea lions from the list of endangered and threatened wildlife under the Endangered Species Act.54 On 13 December 2010 the Service announced its 90-day finding on the petitions, deciding that they presented substantial scientific or commercial information indicating the petitioned action might be warranted (75 Fed. Reg. 77602). Regulations implementing the Endangered Species Act (50 C.F.R. § 424 et seq.) specify 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 Steller sea lion revised recovery plan, released in 2008, called for initiating a status review of the eastern distinct population segment and consideration of a delisting action. The recovery plan noted that the eastern distinct population segment appeared to have recovered from the effects of predator control programs in the 20th century that extirpated animals from some rookeries and haul-out areas, no substantial threats were currently evident, and the population continued to increase at an average rate of 3 percent per year (NMFS 2008).

The Commission submitted comments in response to the 90-day finding, recommending the Service proceed with the delisting process. However, the Commission noted that a decline in Steller sea lion abundance in the southernmost portion of the range presented an exception to the overall positive growth and recovery trend and recommended that the Service take steps to determine the causes behind it. The Commission further recommended that the Service consider recognizing a separate distinct population segment composed of Steller sea lions that occupy the California portion of the species' range, which would retain threatened status under the Endangered Species Act. The Commission expressed the belief that there would be a strong basis to support designation of a California distinct population segment because (1) Steller sea lions found in waters of the Alaska Current are discrete from those in the California Current; (2) the major currents and ecosystems occupied by the two differ significantly; (3) there are no Steller sea lion rookeries between northern Vancouver Island and southern Oregon; and (4) the only Steller sea lions in the waters off the lower 48 states are those in the California Current ecosystem.

Following the public comment period, the Service initiated a 12-month review of the status of the eastern distinct population segment of Steller sea lions. On 18 June 2012 the Service published a proposed rule to delist the eastern distinct population segment of Steller sea lions under the Endangered Species Act. The Commission sent comments to the Service on 2 July 2012, recommending that it proceed with delisting part of the eastern distinct population segment, but at the same time, recognize that the Steller sea lions in the California Current ecosystem may comprise a distinct population segment that merits continued listing under the Endangered Species Act.[55]

54 http://www.fakr.noaa.gov/newsreleases/2012/ssledps041812.htm

55 http://www.mmc.gov/letters/pdf/2012/eastern_delisting_070212.pdf

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Chapter III

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 IV 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.

North Atlantic Right Whale (*Eubalaena glacialis*)

North Atlantic right whales were driven nearly to extinction by whaling that may have begun as early as the 9th century and continued through the early 20th century (Reeves et al. 2007). By 1935, when an international ban on hunting right whales went into effect under the Convention for the Regulation of Whaling (Birnie 1985), North Atlantic right whales may have been reduced to perhaps only 50 or 60 animals (Kenney et al. 1995). Apparently eliminated from the eastern North Atlantic by the middle of the 20th century, the only surviving population of this species is the one that migrates along the east coast of North America. Although this population has shown signs of recovery over the past decade, the rate of increase has been slow and it remains endangered. Factors contributing to the slowness of recovery include a low reproductive rate (adult females bear a single calf every three to five years) and the mortality (and injury) resulting from human activities, notably that caused by ship strikes and entanglement in fishing gear.

The western North Atlantic right whale population occurs primarily along the East Coast of the United States and Canada between Florida and the Gulf of St. Lawrence. Although right whales can be found in all months of the year in the northern portion of their range in the Gulf of Maine, pregnant females and some juveniles and adult males migrate annually from summer feeding grounds off New England and Canada to winter calving grounds off the southeastern United States, mainly off Georgia and northeastern Florida.

In the first two decades after dedicated research on North Atlantic right whales began in the late 1970s, the number of births averaged about 11 per year. During the 1990s, the population was estimated to number about 325 to 350 whales and was possibly declining at about 2 percent per year in that period (Fujiwara and Caswell 2001). Deaths due to ship strikes and incidental entanglement in fishing gear were identified as major factors preventing population recovery at that time (National Marine Fisheries Service 1991). In 2001 the number of births increased abruptly, with an average of about 21 calves observed per year from then through 2011, and the population

increased to perhaps 450 to 500 whales (North Atlantic Right Whale Consortium 2011). Measures to assure continued recovery, however, are still needed. This population's recent rate of increase remains well below the 4 to 7 percent annual increase observed in recovering populations of southern right whales (*E. australis*). Also, it is not known why births increased sharply in the North Atlantic population after 2000, and it is unclear whether the positive trend will continue. In 2012 the observed number of births fell to seven, the lowest since 2000. Although significant conservation efforts have been undertaken to reduce serious injuries and deaths from interactions with vessels and commercial fishing gear, success at mitigating the two issues has differed markedly. Whereas encouraging progress has been made to reduce serious injuries and deaths from ship strikes, entanglement-related injuries and deaths have continued undiminished.

Documented Right Whale Deaths and Injuries in 2012

The numbers and types of North Atlantic right whale deaths confirmed by observed carcasses since 1970 are shown in Figure III-1. From 1990, when efforts to retrieve and examine carcasses improved, through 2012, there have been 73 confirmed deaths, more than half of which have been attributed to either ship strikes (23 deaths) or entanglements in fishing gear (16 deaths). Because all carcasses could not be recovered and examined closely—some are seen only briefly floating offshore—at least a few of the deaths of unknown cause are also likely related to ship strikes or entanglements. In addition, because some whales die and either sink or are eaten by scavengers before being observed and reported, the confirmed deaths on Figure III-1 underestimate total mortality due to ship strikes and fishing gear entanglement by an unknown amount. In addition to known deaths, live right whales are seen each year bearing gear or with scars or injuries of varying degrees of severity as a result of previous interactions with ships or fishing gear.

Right whale deaths: In 2012 three right whale deaths were confirmed: one animal died of unknown causes and two were killed by entanglement in fishing gear. The first carcass found in 2012 was an unidentified adult right whale seen floating 70 nautical miles (nmi) east of Cape Ann, Massachusetts, on 2 March. Due to rough seas and distance from shore, it was not possible to tow the carcass to shore for a

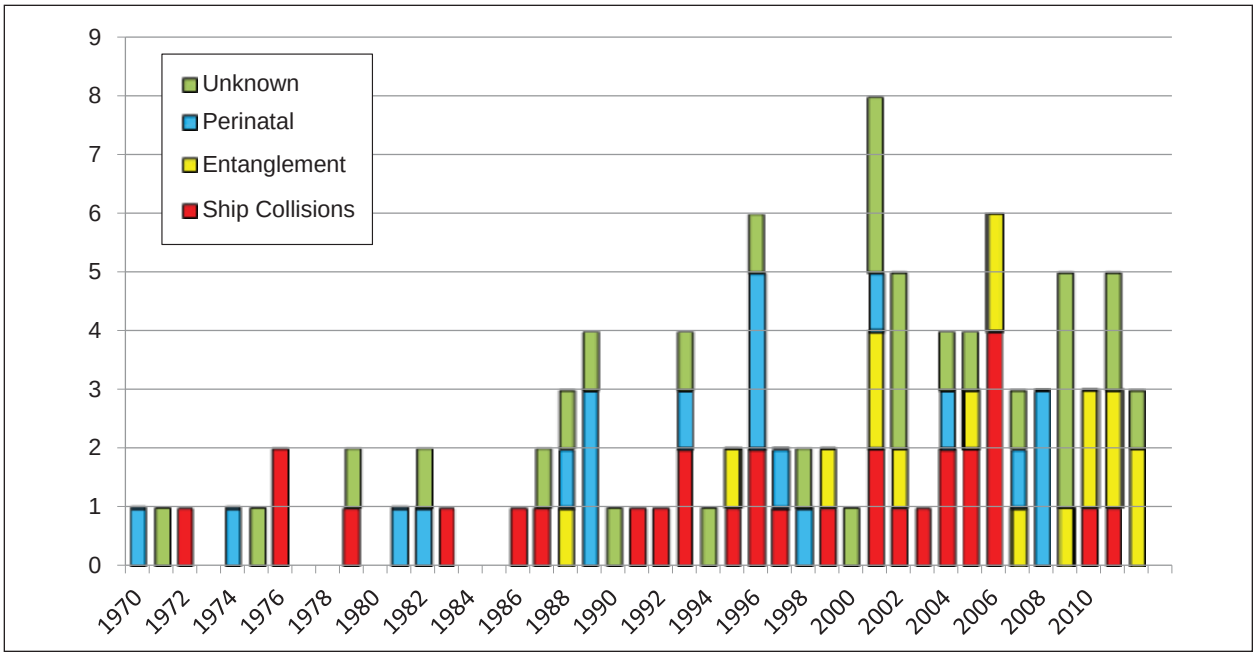

Figure III-1. Known mortality of North Atlantic right whales, 1970–2012. (Source: Marine Mammal Commission unpublished data)

necropsy although a tissue sample was collected to try to match it through DNA analyses to a known whale in the right whale photo-identification catalogue. Its cause of death remains unknown. On 19 July, a second right whale carcass was found stranded in Clam Bay, Nova Scotia, near Halifax. It was too decomposed to carry out a necropsy or to match photographs of this animal against the right whale photo catalogue; however, it had multiple coils of thick green rope wrapped tightly around its tail stock. Injuries associated with the ropes were relatively minor, suggesting it had not been entangled long before dying, but it was thought that the whale might have been held underwater by the fishing gear, causing it to drown. The third carcass was that of a two-year-old whale (whale #4193) found floating 3 nmi off Palm Coast, Florida, on 18 December. After being towed ashore, the carcass was found to have some 200 yards of rope wrapped around its tail stock. Entanglement wounds with signs of healing were observed on the rostrum and flippers and around the mouth, indicating that the whale had been entangled for perhaps a month or more. However, the whale had been seen alive on 28 January 2012, at which time no gear entanglement was reported.

Recent right whale injuries: In addition to the dead whales, at least six other right whales were seen entangled or with entanglement injuries for the first time in 2012. The first was a five-year-old whale of unknown sex (whale #3821) first seen in Cape Cod Bay on 7 January with line and webbing from a gillnet trailing from both sides of the mouth. The whale was resighted in the bay on 16 February when disentanglement responders managed to make two line cuts, but the gear did not come free. It was last seen in 2012 in good condition feeding in the Great South Channel 120 nmi east of Provincetown, Massachusetts, but the animal still had line and a red buoy trailing from the right side of its mouth.

The second new entanglement involved an adult female (whale #1719) seen 15 nmi off St. Simons Island, Georgia, on 19 January with rope extending from its mouth and trailing about 10 feet behind the flukes. Responders were unable to remove any gear, but the whale was subsequently seen on 18 March in Cape Cod Bay gear-free and in good condition. The third new entanglement was a juvenile whale (#3996) found a mile off the tip of Cape Cod on 15 February with monofilament webbing from a gillnet trailing from its mouth. The whale did not appear to be in good condition, and when it was resighted in Cape Cod Bay on 13 April still entangled, its condition appeared to have worsened. An unsuccessful disentanglement attempt was made at that time. The whale was last seen in 2012 on 9 September over Jeffreys Ledge off New Hampshire still entangled. At the time, it was notably thinner, its skin color had turned a pale gray, and it carried an increased load of whale lice, all signs of deteriorating health.

The last three entanglement records in 2012 all involved injured whales seen gear-free, but with fresh wounds of varying severity from recent line entanglements. On 20 July and again on 16 August, a nine-year old male right whale (whale #3308) was photographed by an aerial survey team in the Great South Channel with extensive scarring on the tail stock and the insertion points of the tail flukes. This animal had been seen previously 60 miles to the north on 8 May with no apparent wounds. The wounds observed in July and August appeared to be severe, and the whale's overall condition appeared to have declined since the spring. On 14 August another adult male (whale #1278) was seen in the Gulf of St. Lawrence with significant entanglement wounds on its head, peduncle, and flukes. Poor photographs made it difficult to assess the severity of the wounds, but the whale seemed to be in fair condition. It had last been seen uninjured on 8 May in the Great South Channel. The last newly injured animal (#3610) in 2012 was seen on 24 September in Cape Cod Bay with significant scarring on the tail stock and in thin but fair condition. The whale's condition had declined since the previous sighting without injuries in Cape Cod Bay on 28 February 2012, as it was noticeably thinner and carried an increased load of whale lice.

From January 2000 through 2012, 82 live right whales were seen either entangled or gear-free but with severe entanglement injuries, leaving animals in fair to poor condition. Of those, 56 cases have been resolved. The resolved cases include 12 whales that were either found dead (4 whales) or are now presumed dead (8 whales), having not been resighted for six or more years since last being seen entangled or with serious entanglement wounds, and 44 cases

that ended successfully with the whales subsequently being resighted gear-free and in good condition, presumably fully recovered from their entanglement experience. In 26 cases, the whales were able to free themselves with no assistance, and in 18 other instances either some gear (8 whales) or most or all gear (10 whales) was removed by disentanglement responders. The status of the remaining 26 unresolved cases is summarized in Table III-1.

Ship Strikes: Ship strikes are a major source of right whale mortality. Between 1990 and December 2008, when regulations to reduce ship speeds in designated areas became effective, about a third of all observed right whale deaths (21 of 57 carcasses, or 37 percent) were attributed to strikes by large ships. As noted above, other deaths due to ship strikes undoubtedly have gone undetected.

In the mid-1990s the Marine Mammal Commission began recommending that the National Marine Fisheries Service adopt regulations limiting the speed of large vessels during seasons of peak whale occurrence in areas heavily used by right whales. Action on those recommendations was slow to develop. In part, this was because it was unclear what speeds could be considered safe for whales and what other factors might contribute to ship strikes. To help address those questions, the Commission supported a study to compile records of ship strikes on large whales worldwide (Laist et al. 2001). The results provided several new insights: ship strikes were far more common than previously recognized for several species of large whales; most ship strike deaths were caused by large ships; whales usually were not seen in time for vessel operators to take evasive action; and the number of strikes causing whale deaths or serious injuries declined sharply at speeds below 13 knots and became rare at speeds below 10 knots. Those findings were incorporated into a report prepared under the aegis of two regional advisory groups—the Northeast and Southeast Right Whale Implementation Teams—established by the Service to help implement its right whale recovery program. The report recommended actions to redirect ship routes and to limit ship speeds to 10 knots in areas where whales are most likely to be struck (Russell et al. 2001).

With that information, the Service began to develop a ship-strike reduction strategy. In part, that strategy included (1) outreach efforts to make mariners aware of the problem and of actions they could take to reduce the risks, (2) reorienting vessel traffic lanes through right whale habitat to minimize the chances that large vessels would encounter right whales, and (3) establishing regulations to limit the speed of large ships (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 limiting ship speed were highly controversial among some segments of the maritime community. Such restrictions to protect whales had never before been imposed and some doubted they would work. Nevertheless, the Service adopted a final rule that became effective in December 2008 (73 Fed. Reg. 60173). It included (1) mandatory seasonal speed restrictions in and around right whale calving and feeding areas designated as critical habitat and out to 20 nmi off major ports along the species' coastal migratory corridor between Florida calving and nursery areas and

Table III-1. North Atlantic right whales seen entangled or with significant entanglement wounds between 2000 and 2010 whose fate remains unresolved (Unpublished data compiled by the Provincetown Center for Coastal Studies and 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 – fair to poor condition	10	–	1	11
Entangled – good condition	2	1	–	5
Entangled – fair to poor condition	7	1	1	9
Unidentified individual not resighted	3	–	–	3
Total	22	2	2	26

New England feeding areas (Figure III-2), and (2) voluntary speed restrictions in temporary (i.e., 15-day) dynamic management areas established when groups of three or more whales were sighted within 100 nmi.[2]

A provision added by the Administration after its 18-month review of the final rule stipulated that speed restrictions expire after five years. During that five-year period, the Service was directed to analyze the effectiveness of the speed restrictions and decide if they should be continued, modified, or allowed to lapse. When the five-year sunset provision was added in 2008, the Commission opposed it, noting that five years was insufficient time in which to gather statistically meaningful data, develop possible alternative measures, and go through another rulemaking process. Nonetheless, the sunset clause was adopted, and the Service began collecting and analyzing relevant data.

In early 2012 the National Marine Fisheries Service completed a report analyzing three years of data (Silber and Bettridge 2012). The report concluded that the data were insufficient to reach reliable conclusions about the rule's effectiveness because the annual number of ship strikes detected was too low and too variable between years to detect statistically significant differences. The Service noted, however, that the evidence, though meager, may indicate a reduction in ship strike deaths and serious injuries. It also concluded that mariner compliance with the requirements was relatively low in 2009 and 2010, but showed a marked improvement in 2011. Overall, the time added per ship transit due to the speed limits ranged from 2 to 18 minutes, with the greatest delays (averaging about 26 minutes) affecting refrigerated cargo ships. Based on average fuel, capital, and operating costs and the measured speeds of nearly 60,000 vessel calls in 2009, the total direct and indirect economic impact of the restrictions was estimated to have been $44.7 million, or about one-third of the $137.3 million in costs initially projected. Compared to the nearly $480 billion value in trade goods imported and exported by ship through East Coast ports in 2009, the cost is negligible (Nathan Associates, Inc. 2012).

The Commission wrote to the Service on 20 April 2012 to comment on this report. Based on its opinion that the rule was essential for reducing right whale ship strike deaths, the Commission recommended that the Service take immediate steps to extend the ship-speed restrictions indefinitely, pending the availability of sufficient data to assess their effectiveness with an acceptable degree of confi-

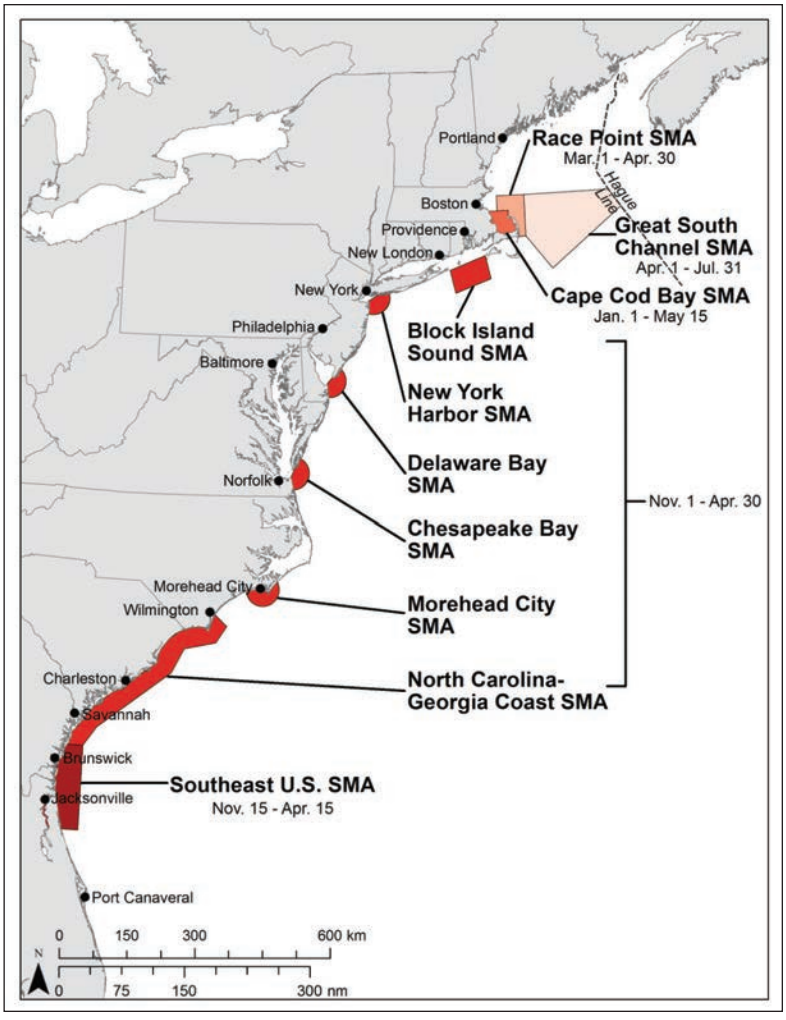

Figure III-2. Locations and dates of right whale management areas requiring large vessel speeds (>65 ft) to be limited to 10 knots or slower. (Figure courtesy of the New England Aquarium)

dence. The Commission noted that other significant changes to the rule added just prior to its adoption in 2008 (e.g., reducing the offshore extent of management zones from 30 to 20 nmi off East Coast ports and making speed restrictions voluntary rather than mandatory in dynamic management zones) had weakened the final rule from the Service's preferred action. Because those changes reduced the geographic extent of the areas where whales were protected and excluded some adjacent waters through which whales were believed to migrate, it had the additional effect of making it more difficult to detect a statistically significant difference in ship strike deaths between before and after the rule was finalized. The Commission recommended that, as part of the rulemaking process, the Service announce plans to (1) reconsider measures contained in the agency's original 26 June 2006 proposed rule (71 Fed. Reg. 36299) and, in addition, (2) consider designating a new seasonal management area for right whale overwintering grounds in the central Gulf of Maine that had been discovered since the original rule was proposed and adopted.

On 11 May 2012 the Service responded. It stated that it was evaluating the vessel speed restrictions, including extension of the vessel speed rule and reconsideration of various components of the existing regulation. On 28 June 2012 the Humane Society of the United States and several other environmental groups filed a petition asking the Secretary of Commerce and the Service to extend the current speed restriction beyond the December 2013 expiration date. The petition also requested that the agency designate one or more additional management areas in the Gulf of Maine where repeated sightings of right whales had led to the designation of dynamic management areas, extend the boundaries of certain seasonal management areas, and make the voluntary 10-knot speed limit in dynamic management areas mandatory.

At the end of 2012 the agency had not yet proposed an extension or alternative to the existing rule beyond its December 2013 expiration date. With no right whale ship-strike deaths in U.S. waters during 2012 and only two such deaths documented since the rule went into effect in December 2008 (both carcasses found far from any established zone), there is growing evidence suggesting that the rule has been effective to some degree. The rate of right whale ship-strike deaths since the rule went into effect is below the rate detected during the previous18 years (i.e., 13 ship strike deaths or 0.73 deaths per year between 1990 and 2008 compared to two deaths or 0.5 whales per year since 2008). In addition, whereas nearly 90 percent of the right whales killed by ships in the 18 years before the rule's effective date were found inside or within 40 nmi of the seasonal management area boundaries established in 2008, neither of the two post-rule carcasses were found in or within 40 nmi of those zones. Thus, ship strikes appear to have been reduced in the areas where mandatory speed restrictions have been established.

Entanglements in Fishing Gear: Entanglement in lines from commercial pot fishing gear and gillnets is the second principal source of human-related right whale mortality. It likely rivals and may exceed ship strike as a cause of right whale deaths. From 1990 through 2012, 22 percent of observed right whale deaths (16 of 73) were attributed to entanglement (Figure III-1). Such deaths, however, are less likely to be discovered than ship strike deaths. When a free-swimming whale is unable to free itself of life-threatening gear, its fat reserves steadily diminish and it dies slowly. Therefore, it is more likely to sink when it dies and thus be undetected. For example, seven whales whose carcasses were never found were last seen entangled or with severe entanglement wounds between 2000 and 2006; these animals are now assumed to be dead due to entanglements because they have not been resighted for six or more years (New England Aquarium, unpublished data). Those assumed deaths, in addition to the five confirmed deaths shown on Figure III-1**,** would exceed the known number of ship strike deaths over that period.

The number of live whales with newly recorded entanglements or serious entanglement injuries also may be increasing. Whereas newly entangled and entanglement-scarred whales averaged 4.5 per year between 2001and 2006, they averaged 6.8 whales per year between 2007 and 2012 (Provincetown Center for Coastal Studies and New England Aquarium, unpublished data). A new analysis of entanglement scars on photographed whales also suggests that one-

fourth of all North Atlantic right whales become entangled at least briefly every year (Knowlton et al. 2012). Together these trends suggest that management measures to date to have done little to stem the number of entanglement-related incidents and deaths (Knowlton et al. 2012).

Since the mid-1990s, the National Marine Fisheries Service has adopted a series of regulatory measures to reduce entanglement deaths, (see Chapter VII). The first measure to offer an encouraging prospect for reducing right whale entanglement risks was a ban on gillnets in most of the species' core calving habitat off the coasts of Florida and Georgia during the winter calving season. The ban was implemented as an emergency measure in 2006 after a right whale calf was found dead with gillnet marks etched in its skin. The ban was made permanent in June 2007 (72 Fed. Reg. 34632). The second measure likely to reduce entanglement risks, which became fully effective in 2009, requires that a significant proportion of lobster pots and most other traps off the U.S. East Coast be outfitted with "sinking" line (i.e., line with a specific gravity heavier than water) in place of "floating" line used to link two or more traps together into "trawls" (73 Fed. Reg. 51228). Because floating ground line can loop 20 feet or more up into the water column between traps and entangle passing whales, sinking line that lies flat along the bottom should reduce entanglement risks.

The greatest current entanglement risk, however, is believed to be from vertical lines connecting bottom-set traps and nets to surface buoys. In 2008, after completing its sinking ground line rule, the Service began a lengthy new rulemaking process to develop new measures to reduce entanglement risks in vertical lines (Figure III-3). Up until that time, the agency had relied almost exclusively on requiring weak links with varying breaking strengths, placed at different positions depending on the fishery and fishing location. Because both unbroken and broken weak links have been recovered from dead and seriously injured entangled whales and because entanglement-related deaths have not declined, weak links appear to be of limited value at best. Recognizing the questionable value of such gear modifications, the Commission has long recommended that the Service prohibit fishing with any lines likely to entangle whales, including vertical lines, in right

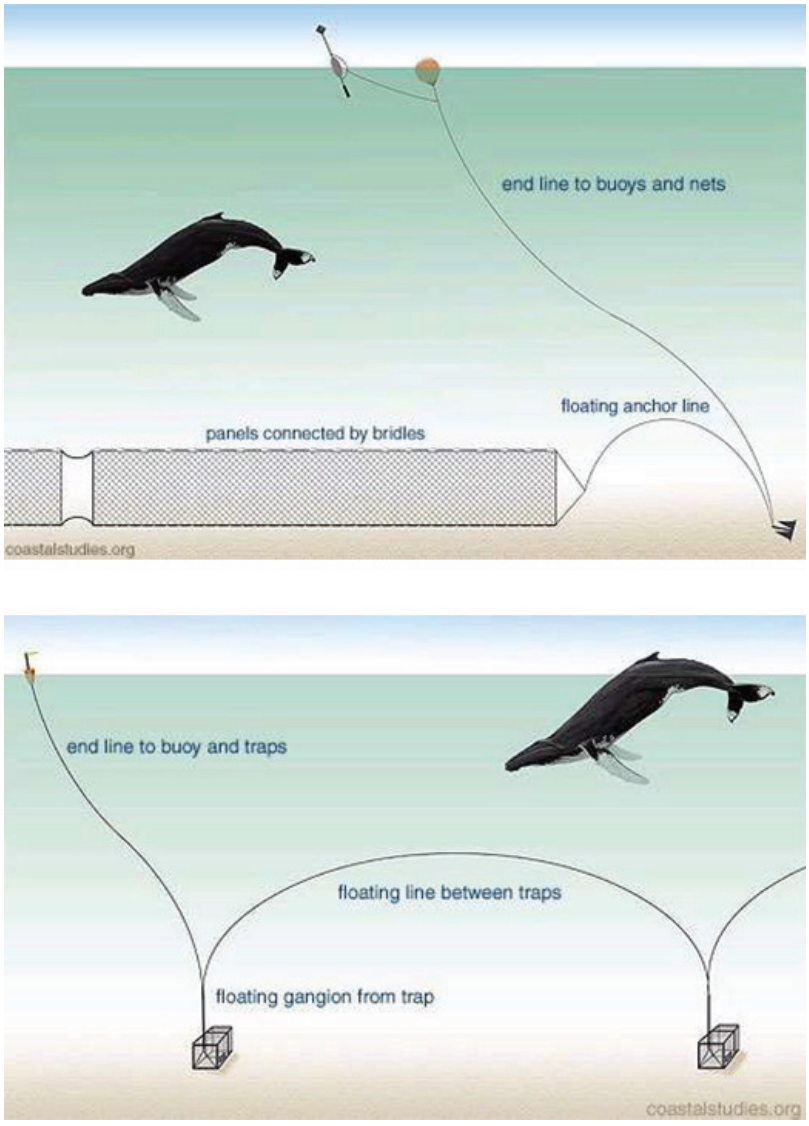

Figure III-3. Configurations of anchored gillnet and lobster pots using floating ground lines no longer allowed in most areas. (Diagrams courtesy of Provincetown Center for Coastal Studies).

whale critical habitat during seasons of peak whale occurrence. Except for the recent ban on gillnets in the calving ground and a seasonal closure for lobster pots in the Great South Channel feeding area off Massachusetts, the Service has consistently rejected this approach even when it would affect only a few fishermen.

Following procedures outlined in the Marine Mammal Protection Act, in 1996 the Service established an Atlantic Large Whale Take Reduction Team to recommend a take reduction plan to reduce entanglement risks for large whales, particularly right whales. The team includes representatives of relevant fisheries, environmental groups, the scientific community, and state and federal agencies, including the Marine Mammal Commission. Its charge is to formulate measures, which are agreed to by consensus, for reducing deaths and serious injuries of large whales to below their potential biological removal (PBR) levels (i.e., the maximum number of animals, not including natural mortality, 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 the measures' implementation. For North Atlantic right whales, PBR currently is calculated at just 0.9 whales per year (Waring et al. 2012). To date, take reduction team members have been able to agree on only modest gear modifications, such as use of weak links, which are unlikely to have much effect on reducing entanglement risks. As a result, it has largely been left to the Service to choose take reduction plan measures.

To develop new rules for vertical lines on lobster traps and gillnets, the Service convened five meetings of the Atlantic Large Whale Take Reduction Team between 2008 and 2011. Instead of continuing to rely solely on gear modifications, the team agreed to consider ways of reducing the number of vertical lines present in areas where whale entanglements were most likely. Identified means for doing so included increasing the number of traps per buoy line, establishing caps on the number of buoy lines, and applying seasonal restrictions on the use of fishing gear with vertical lines in high-use right whale habitat. To guide deliberations and help evaluate possible alternatives, the team recommended development of a "co-occurrence" model to identify areas of greatest risk to right whales and other large whales. The model combines data on monthly densities of both whales and vertical lines in individual blocks of 10-minute latitude/longitude covering the entire U.S. Exclusive Economic Zone along the Atlantic coast. The Service contracted with a group of modeling experts to create the model, gather relevant data, and analyze proposed measures.

In 2010 and early 2011 the team examined preliminary model results. In part, they revealed that 90 percent of the vertical lines and entanglement risk occurred off New England. In reviewing the model's predicted co-occurrence of gear and whales, scientists on the team expressed concern that the results were underestimating co-occurrence because the model assumed no whales were present in grid cells where no survey effort had been conducted or where there was very little survey effort and no sightings. Because the model multiplies whale density by estimated vertical line numbers to compute a co-occurrence score for each cell, a whale density of zero produces a predicted co-occurrence of zero. This was particularly troubling along the coast of Maine where densities of lobster traps are extremely high and many model cells assumed no whales were present. This conclusion was based on a lack of survey effort even though opportunistic sightings, whale entanglements, and telemetry studies clearly demonstrated that right whales were present at least occasionally. Team scientists therefore asked the Service and its contractor to evaluate ways of developing more realistic estimates of minimum whale densities for areas where little or no survey effort had been conducted, particularly for areas with high gear densities. Despite repeated requests, no action was taken to correct or evaluate the problem.

In June 2011 the Service requested public comment on its intent to prepare an environmental impact statement on new rules to reduce whale entanglement risks in vertical lines of commercial trap and gillnet fisheries along the U.S. East Coast. The Commission, in consultation with its Committee of Scientific Advisors, responded on 12 September 2011, recommending that the draft environmental impact statement analyze alternatives for large seasonal management areas in the Gulf of Maine within which a suite of

measures would be established, including seasonal closures in areas where whale densities were greatest, caps on the numbers of end lines, minimum numbers of traps or pots per string, and requirements for tending deployed gillnets and returning nets to port with the vessel.

Sharing the concerns raised by team scientists about the co-occurrence model, the Commission also recommended that the Service consult with whale biologists on the Atlantic Large Whale Take Reduction Team to estimate whale densities for model cells showing zero densities based on limited or no survey effort, particularly for areas within 20 miles of the Maine coast where gear densities were highest and where even low whale densities could produce significant entanglement risks. The Commission also recommended that gear marking requirements be developed to better identify the fisheries, fishing areas, and gear components involved in large whale entanglements. Finally, because past rules had repeatedly failed to meet required take reduction goals and repeated rulemaking processes requiring five years or more served to delay implementation of needed protection measures, the Commission recommended that the draft statement identify contingency management measures that could be implemented if the new rules again failed to achieve the Service's predicted level of effectiveness.

Take reduction team meetings in 2012: The Service convened two meetings of the Atlantic Large Whale Take Reduction Team and two team sub-group meetings during 2012. On 9–13 January 2012 the team again met to discuss proposals for reducing risks posed by vertical lines and to try to reach agreement on alternative measures for inclusion in the Service's environmental impact statement on amendments to the Atlantic Large Whale Take Reduction Plan. Five proposals were prepared in advance of the meeting to give the Service's contractor time to evaluate their effect using the co-occurrence model. Two proposals were developed by the Service—one for the northeast region off New England and the other for the mid-Atlantic/southeast coast from New York to Florida—and three were prepared by state fishery agencies with measures for areas of immediate interest to each state. Each proposal involved complex networks of management zones requiring different numbers of traps per string and either one or two buoy lines per string. Several proposals also included areas to be exempted from any restrictions. The team also considered options for marking gear, including a proposal by the Commission's representative for a simple color scheme that could be painted on lines. The purpose of gear marking would be to enable researchers faced with an otherwise nondescript line removed from a whale to determine its origin (e.g., which type of fishery the line is from, the region in which the gear was set, and whether the line was deployed as a ground line or a buoy line.

At the January 2012 team meeting, the analyses of the proposals by the Service's contractor were presented in terms of the percentage reduction in vertical line numbers. The Service's proposal for the northeast region, where the vast majority of vertical lines occur, proposed to exempt some Maine state waters from regulation. Thus, the proposal excluded a large but unidentified proportion of the northeast region's vertical lines. For the areas it proposed to regulate, the Service identified more than 20 different management areas with varying combinations of minimum trawl lengths (2 to 20 traps per trawl) and a requirement for using only one buoy for strings of five traps or fewer. The co-occurrence model predicted a reduction of about 40 percent in the number of vertical lines in non-exempted waters; an estimate of overall reduction in vertical line numbers including those in exempted areas was not provided. Local reductions predicted for state proposals were somewhat smaller, in part because the states of New Hampshire and Massachusetts proposed exempting portions of their state waters as was done in Maine and partly because they included management areas allowing shorter trawl lengths. A few additional proposals were put forward during the meeting, but at the meeting the Service's contractor was unable to evaluate the extent to which these would reduce the numbers of vertical lines.

There was general support for the various proposals, but no consensus was reached on any of them for several reasons. Recognizing that the risk of entanglement from any individual line could vary greatly depending on the density and behavior of whales in the area where it is set, neither the Service nor the team was able to correlate reductions in ver-

tical line numbers with reductions in whale deaths and serious injuries. Therefore, with no clear goal as to the extent to which vertical line numbers needed to be reduced to reduce whale deaths and serious injuries below PBR (i.e., the plan's immediate goal), team members were required to make subjective judgments concerning the adequacy of proposed measures. In addition, the model results were provided only in terms of percentage reduction in vertical lines—not co-occurrence scores intended to reflect entanglement risk. They also did not reflect overall reductions in line numbers, including lines exempted from regulations. Scientists on the team also again noted the concern that predicted risks may be significantly underestimated because the model had not been corrected to account for times and areas where whale densities were estimated as zero despite the fact that there had been little or no survey effort and it was known from information sources other than limited surveys that whales occur in those areas at least occasionally.

Given such challenges, there was a wide disparity of views regarding the potential effectiveness of the various proposals. Whereas fishermen on the team believed proposed reductions were excessive or impractical in some areas, conservationists and scientists concluded that they were insufficient and that seasonal fishing closures in high-use right whale habitat would also be needed. Fishermen on the team again strongly opposed any closures, reiterating past assertions that displaced gear would form a wall of vertical lines around closure perimeters and increase entanglement risks for any whales entering and leaving a closure area. With no agreement on the proposals discussed at the meeting and requests for additional analyses, the Service told the team it would consider additional proposals by team members that were submitted by early February 2012, have them evaluated using the co-occurrence model, and provide the results to the team in a subsequent webinar session.

By early February 2012 seven new proposals had been submitted, including two revisions of vertical line schemes proposed by state fishery agencies and five proposals for seasonal fishing closures. Conservation groups represented on the team jointly recommended three seasonal closures, along with recommendations for gear-marking requirements, analyzing entanglement risks in areas exempted from regulations under the various proposals, addressing the conservation needs of humpback whales as well as right whales, and mitigating entanglement risks in the southeast region (e.g., fishery-specific caps on fishing effort in right whale calving grounds off Florida and Georgia). Their three proposed seasonal closures, which were to apply to both lobster and gillnet fishing, included portions of two designated right whale critical habitat areas—one in Cape Cod Bay (and adjacent areas to the north and east of Cape Cod) from January through April and one in the Great South Channel from April through June—and a third area around Jeffreys Ledge east of New Hampshire and southern Maine from October through December. Scientists on the team submitted two closure proposals: one for Jordan Basin in the central Gulf of Maine to be closed from November through January (also supported by conservationists on the team), and the other in Cape Cod Bay covering only part of the area proposed by the conservation groups. These proposals were reviewed by the team during a February 2012 conference call.

Because no action had been taken in response to repeated requests by team scientists to modify whale density values in model grid cells where few or no surveys had been conducted, the Marine Mammal Commission contracted with one of the team's scientists to develop a scientific approach to address the concern. The resulting report (Kenny 2012) was reviewed by other team members who had shared the concern and was submitted to the Service with unanimous support of the team's scientists and conservationists. Accompanying the report was a recommendation that the approach (or its equivalent) be used by the Service's contractor to modify the co-occurrence model so as to better reflect both entanglement risks for whales and conservation benefits resulting from proposed and alternative mitigation measures. It also was recommended that the Service hold a meeting or conference call between team scientists and the Service's contractor to review the analysis and agree on a method to derive whale density values for use in the model.

On 11 April 2012 the Service convened two team sub-group meetings by conference calls, one

with the northeast sub-group and the other with the southeast sub-group. The purpose was to present results of new and revised model evaluations for each proposal. At the beginning of the meeting, the Service acknowledged receipt of the scientists' proposal to modify the model but advised that it was too late in the process of developing the environmental impact statement to modify the model, given the need to move ahead with evaluating alternative actions. Instead, the agency said it would consider conducting some form of sensitivity analysis to assess the effects of this factor on model results. The Service also noted that team consensus had not been reached for addressing this model deficiency. It was unclear how a sensitivity test could be done without changing the model as had been requested. The Service, in consultation with its contractor, allowed its contractor to subcontract the same team scientific member to assist in the development of the sensitivity analysis.

With regard to the new management proposals, model results were provided describing reductions in both line numbers and co-occurrence risk scores for non-exempt regulatory areas. When each of the various alternatives was added to the Service's proposal for non-exempt regulatory areas, almost all alternatives produced the same result—a reduction of about 34 to 36 percent in both vertical line numbers and entanglement risk. Options that included measures put forward by state representatives on the team generally weakened protection for whales, and when all state plans combined were substituted, line numbers and co-occurrence risk scores were reduced by about 25 percent. Recognizing that it would not be possible to reach agreement on any of the proposals or sets of proposals, the agency invited team members to submit individual comments on the new presentation by the end of April.

Eleven sets of comments were subsequently submitted to the Service by individual members or groups of members. The Commission recommended that closures for Jordan Basin, Jeffreys Ledge, Great South Channel, and Cape Cod (the non-governmental organizations' proposal) be included as part of the proposed action. The Commission also recommended that the co-occurrence model be modified as recommended in the proposal submitted jointly by the team's scientists and conservation group representatives and that, once revised, the model be peer-reviewed by an independent group of experts. As a related matter, it was also recommended that predicted reductions in co-occurrence risks be reported according to the boundaries of management areas used in the proposals (including exempted areas), rather than just regionally and coast-wide, so that the effects of individual proposal components could be considered separately.

The Service subsequently began work to develop a preferred action and rule as well as alternatives to be evaluated in its draft environmental impact statement. At the end of 2012 the team had not yet been advised as to what steps, if any, had been taken to either revise the model as recommended by team scientists and conservationists or to conduct the sensitivity analysis to evaluate the effect of the current model's assumption that no whales occur in times and areas with little or no survey effort. The Service had, however, convened a panel through the Center for Independent Experts to conduct a peer review of the co-occurrence model. The review was completed during the summer, but the results were not provided to the team or otherwise made available before the end of 2012. The draft environmental impact statement is expected to be completed in 2013.

Petition to Revise Critical Habitat for North Atlantic Right Whales

In July 2002 the Ocean Conservancy submitted a petition to the National Marine Fisheries Service asking that it revise the boundaries of North Atlantic 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 human-caused mortality and that additional areas needed to be designated to ensure the survival and recovery 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. Although the Service conducted various analyses evaluating habitat features critical for right whales, it took no further 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. After the Service failed to make a 90-day finding on this petition, the petitioners filed a lawsuit on 25 May 2010 alleging that the Service was in violation of requirements for responding to such petitions (*Humane Society et al.* v. *National Marine Fisheries Service, et al*., No. 10-10873-PBS, District Court for Massachusetts).

Following a court settlement, the Service published a notice (75 Fed. Reg. 61690) in 2010 announcing a positive 90-day finding and its intent to complete a review of the petitioned action within 12 months. As part of that review, the Service would consider the physical and biological features essential to the species' conservation. It also would complete an environmental impact analysis as part of its efforts to develop a proposed rule to modify critical habitat boundaries. The Service planned to make that analysis available for public comment in the second half of 2011, but it had not done so by the end of 2012.

Hawaiian Monk Seal (*Monachus schauinslandi*)

Hawaiian monk seals breed only in the Hawaiian Archipelago and are one of the most endangered seals in the world. Their most recent abundance estimate is about 1,100 seals, and their number is currently declining by about 3 percent annually. Most Hawaiian monk seals live in the remote, uninhabited Northwestern Hawaiian Islands (NWHI, Figure III-4). In recent years, however, a small and growing population has established itself in the Main Hawaiian Islands (MHI). About 900 seals live in the NWHI and at least 150 inhabit the MHI.

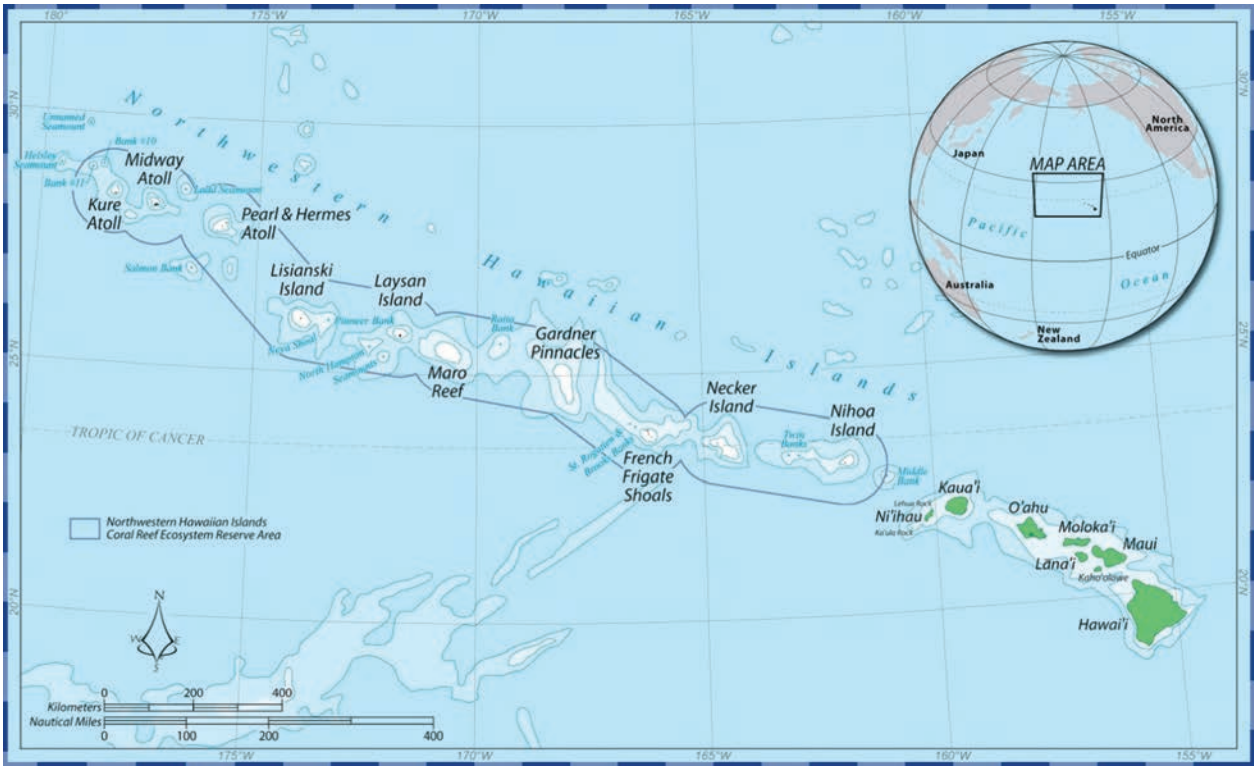

Figure III-4. Map of the Northwestern Hawaiian Islands archipelago. (Source: NOAA)

Historically, the principal causes for population decline in the NWHI were hunting and human disturbance from guano mining, feather hunting, shipwrecked sailors, and other activities in the 19th and early 20th centuries. During the latter half of the 20th century, commercial fishing and military operations were thought to have been major causes of decline. Baker et al. (2012) found that long-term monk seal trends in a portion of the NWHI were in synchrony with the changes in productivity accompanying the Pacific Decadal Oscillation and argue that this natural forcing was as strong, if not a stronger driver of monk seal trends at some sites than negative effects of human presence. Human disturbance was greatly reduced in the 1980s and 1990s as the U.S. Navy and Coast Guard closed various NWHI facilities and commercial fishing and other extractive activities were phased out following creation of the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve in 2000 and establishment of the Papahānaumokuākea Marine National Monument in 2006. Despite protection from human disturbance, the species has continued to decline in the NWHI today due to a number of threats that include (1) starvation due to lack of prey, likely brought about by long-term changes in oceanographic conditions and perhaps ecological changes caused by commercial fishing, (2) entanglement in marine debris, (3) predation by sharks, (4) attacks on pups and females by aggressive adult male seals, and (5) loss of pupping beaches due to rising sea levels.

The most encouraging sign for the species' long-term survival has been the recent increase in monk seal numbers in the MHI. Monk seal breeding colonies apparently were eliminated from the MHI soon after the first Polynesians arrived in Hawaii perhaps 800 to 1,200 years ago (Lowry et al. 2011, Wilmshurst et al. 2011). Although there were scattered earlier reports of monk seals in the MHI, beginning in the 1970s, monk seals apparently began showing up regularly on the beaches on the privately owned island of Niihau, the westernmost of the MHI and closest to the NWHI, and radiating eastward to Kauai, Oahu, and other islands. The population in the MHI is now thought to be growing at a robust rate, with 10 to 15 pups born each year (not including births on Niihau where data are not available). If current rates of increase in the MHI and decrease in the NWHI continue, 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) (Figure III-5). While the increase in the MHI provides the public an opportunity to see monk seals in the wild, it also has led to increased in interactions with beachgoers and recreational fishermen and exposes seals to diseases from domestic and feral animals. Such interactions pose significant new research and management challenges that must be addressed if the Hawaiian monk seal is to recover.

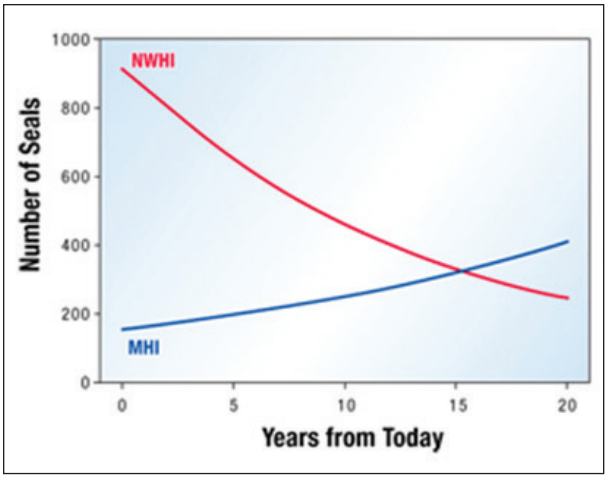

Figure III-5. Twenty-year growth projections from 2010 to 2030 for Hawaiian monk seals in the Northwestern Hawaiian Islands and Main Hawaiian Islands. (Source: National Marine Fisheries Service)

The National Marine Fisheries Service has lead responsibility for Hawaiian monk seal research and management. The Service 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 Office of National Marine Sanctuaries in the National Ocean Service, the National Park Service, the U.S. Navy, and the Marine Mammal Commission. Other important partners include non-governmental groups such as the Marine Mammal Center, Hawaii Wildlife Fund, Marine Conservation Institute, the Kauai Monk Seal Watch Program, Hawaiian Monk Seal Response Team Oahu, Monk Seal Foundation, Waikiki Aquarium, and many citizen volunteers in the MHI.

To help guide recovery work, the Service established the 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 plan specifies that, in order to qualify for delisting species from the Endangered Species Act list, all of the following criteria must be met: (1) aggregate numbers exceed 2,900 seals in the NWHI, (2) at least five of the six main subpopulations in the NWHI are above 100 individuals and the MHI population is above 500, and (3) survivorship of females in each subpopulation in the NWHI and the MHI is high enough that, in conjunction with birth rates, the overall population rate for each subpopulation is positive. Since early 2011 the Service has been unable to convene the team due to funding cuts.

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 has held its annual meetings in Hawaii, every three to five years to stay abreast of monk seal recovery efforts. The last annual meeting held there was in 2009 to review monk seal recovery work by the Service and its key partners. The Commission continues to work closely with the Service and other agencies to improve recovery prospects for the species.

Funding for Hawaiian Monk Seal Recovery

Inadequate funding has been a longstanding problem for the Hawaiian monk seal recovery program (Lowry et al. 2011). 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 III-4) are substantial. Nevertheless, such work is crucial. Personnel deployed to seasonal field camps at all major breeding sites not only collect essential data on the seals, such as their abundance, age structure, and vital rates, but also monitor and mitigate factors impeding their recovery, such as entanglement in marine debris, predation by sharks, instances of male aggression toward pups and juvenile females, and parasites that compound problems caused by inadequate prey. In most years, staff are present at major breeding atolls for about one-third of the year, principally during the spring and summer pupping and nursing season.

To address the problem of inadequate resources, Congress increased the National Marine Fisheries Service's appropriations for work on Hawaiian monk seal in FY 2009 to $5.7 million, more than twice the agency's requested level. The increase allowed an expansion of field work in the NWHI and filled many unaddressed research and management needs in the MHI. These efforts have been described in the Commission's 2009, and 2010–2011 annual reports and are touched on below. For FY 2010 the Service was able to maintain funding at nearly the same level—$5.4 million—but in FY 2011 it declined about 40 percent to $3.3 million and then increased only slightly in FY 2012 to about $3.5 million. Those levels were about half the annual amount of approximately $7.2 million identified as necessary in the agency's recovery plan. In FY 2013 funding is expected to decrease further, given anticipated cuts in the federal budget.

In light of this situation, the Marine Mammal Commission has written to the Service on several occasions noting that recovery of the Hawaiian monk seal should be one of our nation's highest marine mammal priorities and that funding reductions should be made in other areas. The Commission has recommended that the Service fund the monk seal recovery program at the full $7.2 million level prescribed by the 2007 recovery plan or at least at the $5.6 million level required to sustain conservation initiatives begun in FY 2009–2010. In its letters, the Commission noted that essential recovery actions for Hawaiian monk seals require a budget both large enough and consistent enough over time to ensure a focused, sustained response to current threats facing the species. While funding increases in 2009 and 2010 gave the recovery program a much greater capacity to respond to threats in both the NWHI and the MHI, subsequent funding decreases have undermined much of that progress. Without a sustained level of adequate funding, the Service is no longer able to maintain full-season field camps in the NWHI to collect population data and carry out important interventions to save individual animals (see below). It also has

been unable to implement necessary conservation and public outreach initiatives to mitigate interactions between seals and people in the MHI.

Hawaiian Monk Seals in the Northwestern Hawaiian Islands

Below we elaborate on the activities carried out by NMFS and its partners during annual field camps in the NWHI.

Population monitoring: Annual spring and summer field camps in the NWHI have been essential 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 seals that are injured or in poor health. Service records from 1980 through 2011 indicate that field teams undertook interventions that improved the probability of survival of more than 530 seals. Including captive care and other types of activities, about 30 percent of the monk seals alive today benefited from those conservation interventions (National Marine Fisheries Service unpublished data). In addition, the female seals that survived after those interventions have given birth to at least 220 pups, significantly improving pup production in the NWHI and the size of the current population.

As described in the Commission's 2009 and 2010–2011 annual reports, with the additional funds provided by Congress in 2009 and 2010, the Service was able to (1) extend 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 deworming trials and assess the effectiveness of year-round management efforts, and (3) increase field research at a smaller breeding site, Nihoa Island. In 2011, despite funding cuts, the Service was able to take advantage of cruise schedules to continue field efforts at all six major breeding atolls at nearly the same level as 2010. It also maintained its winter field camp at Laysan Island. In 2012, however, the Service was able to sustain field crews for only 30 to 44 days on the major breeding atolls, reducing field time by 50 to 80 percent compared to previous years.

The shortened field season drastically reduced opportunities to rescue, treat, or otherwise assist seals. In 2011, when the field season at the major atolls was several months long, researchers were able to intervene on 63 occasions to improve survival rates for seals. In the shortened field season in 2012, researchers were available to intervene only 16 times (National Marine Fisheries Service 2013). The abbreviated field season also resulted in greater uncertainty in the ability to detect either positive or negative changes in NWHI population abundance and trends, population structure, survival rates, and the frequency of conservation threats such as entanglement, shark predation, and attacks on pups by aggressive males.

Although population monitoring results at the six major NWHI breeding atolls were less reliable than in the past, they suggest a continuing decline in pup production, including a decrease from 141 pups in 2011 to 111 in 2012, and a continuing decrease in overall estimated abundance from 909 in 2011 to 863 in 2012 (National Marine Fisheries Service 2012b). The extent to which these declines might reflect decreased sightings as a result of reduced field camp occupancy is uncertain.

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

Deworming trials: Monk seals, like all mammals, carry internal parasites that absorb nutrients

from food in the stomach and intestine and cause various ailments (e.g., gastrointestinal ulcers). Administering medication to rid juvenile monk seals of such parasites may improve nutrient uptake and increase the chances of survival to breeding age, at which point survival rates improve significantly. In 2009 Service scientists began testing a sample of juvenile seals at Laysan Island with an injectable deworming drug to determine if such treatments improve their condition. In 2011 the Service completed analyses of its initial trials and concluded that initial efforts had not been effective in reducing parasite loads but that consideration should be given to using different drugs and different means of administering them (Gobush et al. 2011).

In 2011 the Service tested a new topical drug, Profender, which had been used with success on captive California sea lions. As the drug is applied to the skin, it can be administered without restraining animals while they are hauled out. The new drug was field-tested on 17 monk seals, and field scientists found they could apply it while the seals are asleep on the beach without disturbing them. At the end of 2011 preliminary analyses indicated that the drug caused no ill effects on the seals and that it had reduced or eliminated parasites in some but not all seals. The Service therefore expanded efforts to apply the new drug, and in 2012 field teams applied it to 53 juvenile seals at Laysan Island, Lisianski Island, and Kure Atoll to help reduce parasitic loads and improve body condition (National Marine Fisheries Service 2012b). Further monitoring will be required to determine whether the treatment improves overall juvenile survival rates.

Translocation: In the past, scientists and managers have brought malnourished pups and juveniles into captivity to restore them to good condition and then return them to the wild in the NWHI. That approach was used in the 1980s and early 1990s, but it was expensive and exposed the seals to various additional risks. In the mid-1990s 10 of a group of 12 seals brought into captivity developed an eye ailment that led to blindness and caused the Service to halt this program.

As an alternative measure for improving juvenile survival, the Service moved some weaned pups and juveniles from French Frigate Shoals, where their survival was particularly poor, to other atolls or islands in the NWHI where foraging conditions are considered better and juvenile seals have higher survival rates. Nihoa Island 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 the translocated seals could not be determined reliably. In 2012 two of the 12 translocated seals were resighted at Nihoa, but again, because of reduced funding, researchers were unable to identify all seals and determine how many other translocated seals might still be present and alive. In 2012 two juvenile seals were moved from French Frigate Shoals to Laysan where juvenile survival rates have increased in recent years.

The highest juvenile survival rates and the healthiest appearing juvenile seals are now found in the growing MHI populations (Baker et al. 2011). Therefore, another translocation option that has been considered for improving juvenile survival in the NWHI has been to move newly weaned and juvenile female seals to waters around the MHI until they reach the age of three years, an age at which their survival rates approach or exceed 90 percent, whether in the NWHI or MHI. At that time, the seals could be captured and returned to the NWHI. Although the Service began planning for such a two-stage translocation, agency scientists cautioned during the Commission's 2009 annual meeting that it would require considerable advance analyses and preparation. In addition, they noted that such a program could be controversial because some people in the MHI strongly oppose the presence of seals and believe that an increase in seal numbers by moving animals from the NWHI, even temporarily, would result in increased interactions with recreational and subsistence fishing and a decrease in their target fish populations. Because monk seals generally do not forage on the species targeted by fishermen, the Commission believed it would be unlikely that a few additional seals would significantly affect fishing or fish stocks. The Commission therefore recommended that the Service consult with the Hawaiian Monk Seal Recovery Team and key recovery program partners to pre-

pare and further analyze a two-way translocation plan to temporarily move female seals from the NWHI to the MHI.

To assess the potential utility of a translocation between the MHI and the NWHI, the Commission also recommended that the Service move an equal number 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. It would also facilitate assessment of the ability of seals raised in the food-rich environment in the MHI to readjust to the relatively food poor environment in the NWHI. Also noting that pup production in the NWHI is declining rapidly, the Commission urged the Service to move as quickly as possible with planning, securing necessary permits and funding, and preparing the necessary environmental impact statements. In response, the Service noted that it had contracted for the preparation of a programmatic environmental impact statement to evaluate the impact 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 environmental impact statement in the summer of 2011 and the Commission provided further comments and recommendations in November 2011. However, due to funding limitations and further steps needed to ensure translocated seals could be monitored and protected during their stay in the MHI, no efforts were taken in 2012 to proceed with the translocation.

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[1] 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. In 2010 and 2011 known and inferred shark-caused deaths at French Frigate Shoals declined slightly to 16 percent (6 of the 37 pups) and 14 percent (5 of 37 pups), respectively, but remained a concern. In 2012, 34 pups were counted and two shark-related deaths were known or inferred; four other pups were documented with shark bites. Due to the significantly shortened field season at French Frigate Shoals in 2012, it is not known whether rates of shark-related deaths declined, increased, or remained stable.

Galapagos sharks have been responsible for all observed shark attacks at French Frigate Shoals since 1997, and it was thought the problem was being caused by a small number of individual sharks that learned to patrol pupping beaches there to catch unwary pups. To reduce the number of shark-related deaths, the Service has moved newly weaned pups to other islets at the atoll where shark predation is less common. In 2010 and 2011, all pups surviving to weaning (i.e., 17 and 15 pups, respectively) were moved to areas of low shark predation and all were alive when field teams left at the end of the field seasons. In 2012, 10 newly weaned pups, including two that survived major shark bites, were moved to another islet at the atoll with low shark predation and, again, all were alive when the field crew left. In addition, as noted above, two other newly weaned female pups were moved to Laysan Island where prey resources are more abundant and juvenile survival rates are higher.

Although the Service has also considered moving mother and pup pairs before pups are weaned, it is believed that doing so would pose too great a risk of disrupting the mother-pup bond essential for the pup's survival. Therefore, as an alternative approach to reduce shark predation, the Service has been identifying and attempting to catch and kill sharks observed preying on pups. Those efforts have focused exclusively on Galapagos sharks near pupping sites and involve the use of baited hooks closely tended or monitored from shore. When other species of sharks are caught, they have been released alive when possible. Efforts to catch sharks began in 2000, but success has been limited as the sharks quickly learned

1 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.

to avoid people and boats. Between 2000 and 2007 field personnel caught and killed 12 Galapagos sharks. Although shark predation declined somewhat, it remained higher than that observed at any other atolls.

Catching and killing sharks have been controversial. Among other things, Native Hawaiians hold a special reverence for sharks and have opposed killing them unnecessarily. In addition, resource managers at the Papahānaumokuākea Marine National Monument, which has responsibility for protecting all marine species in the NWHI, have been reluctant to grant permits to deliberately kill any marine predators in the Monument. Therefore, in 2008 and 2009 the Service suspended efforts to catch sharks while testing various shark deterrents and conducting studies funded largely by the National Marine Sanctuary Office's NWHI Coral Reef Ecosystem Reserve to document shark movements at the atoll. None of the deterrent methods tried were either effective or promising (Gobush and Farry 2012). At the same time, results of the shark studies confirmed that only a few dozen individuals in the Galapagos shark population at the atoll, estimated to number about 600, patrolled waters near monk seal pupping beaches. Therefore, in 2010, with support from the Commission and the Hawaiian Monk Seal Recovery Team, the Service renewed efforts to catch the few sharks believed to be preying on monk seal pups. Several new methods were used, including short drum-lines, five-hook bottom-sets, 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. The sharks, however, remained elusive and only one Galapagos shark was caught in 2010 and 2011. In 2012 no Galapagos sharks were caught. During this period, six tiger sharks and two white tipped reef sharks were also caught, all of which were released alive.

Entanglement in marine debris: Since 1982 Service scientists have documented 311 entangled seals on NWHI and MHI beaches (Figure III-6). Of those, 209 were disentangled, 86 freed themselves, 8 died, and the fate of 8 others was not determined. The number of seals that drown at sea or die on beaches from net wounds and abrasions when biologists are not present 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, of which 9 were disentangled and released alive and 4 escaped unaided. In 2011, 12 seals were found entangled, 8 in the NWHI and 4 in the MHI. One freed

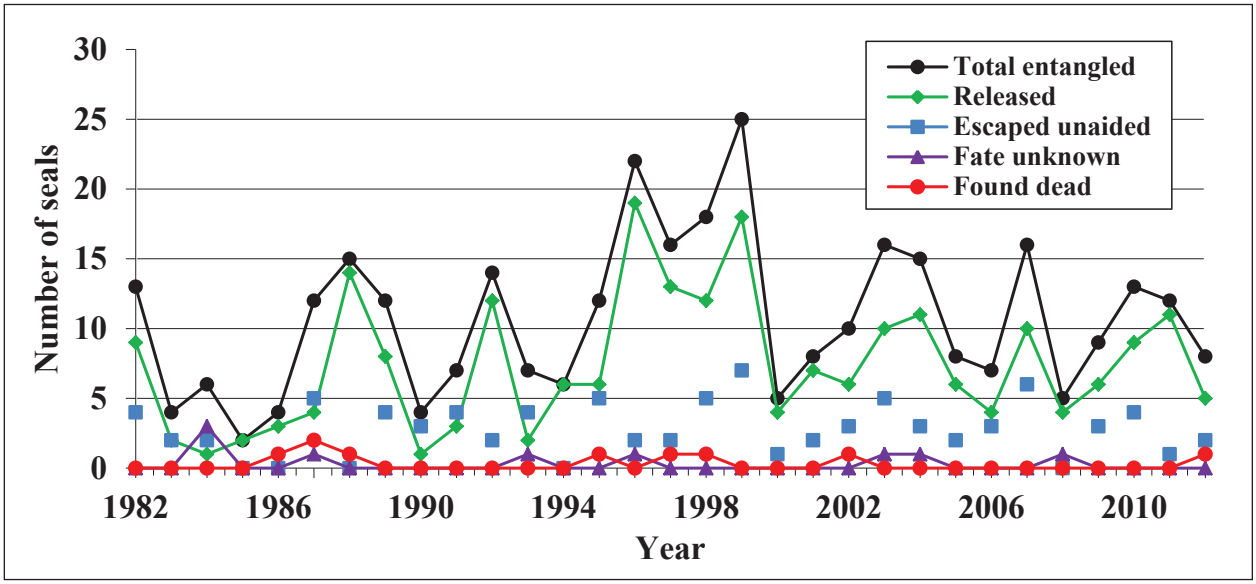

Figure III-6. Number of Hawaiian monk seals observed entangled from 1992 through 2011. (Data provided by the National Marine Fisheries Service, Pacific Islands Fisheries Science Center)

itself and the rest were disentangled and released in good condition. In 2012, eight entangled seals were discovered in the NWHI (Figure III-7), five of which were disentangled by field teams, two freed themselves, and one, a pup on Midway Atoll, was found dead. The decrease in reported entanglements in 2012 is likely due to shortened field seasons at all the major breeding atolls rather than to decreased entanglement rates.

In addition to disentangling animals, field crews in the NWHI remove hazardous debris from atoll beaches. In the late 1990s work also began to remove net debris caught on the coral outcrops in lagoons surrounding the atolls. Together, 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 of the vessel support for this work. The latter's Office of National Marine Sanctuaries and other agencies, including the Fish and Wildlife Service, and the state of Hawaii, have provided personnel, in-kind support, and/or funding. In 2005 clean-up efforts were reduced to a maintenance level, but accumulation rates since then have been greater than anticipated.

The Service's Coral Reef Ecosystem Division serves as the lead agency for coordinating NWHI debris clean-ups. During 2010 it organized two clean-up trips removing 286 derelict nets or net fragments weighing more than 20 metric tons. In 2011 funding constraints reduced operations to a single trip. The trip involved 10 days of clean-up work at Midway and, on its return leg the vessel made stops at Pearl and Hermes Reef, Laysan, Lisianski, and French Frigate Shoals to pick up debris removed from beaches by monk seal field teams. In 2011, 15 metric tons were removed.

Figure III-7. Entangled Hawaiian monk seal found and disentangled by a Fish and Wildlife Service volunteer on Laysan Island in the NWHI in June 2012. (Photo courtesy of the National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Marine Mammal Permit #10137, photograph by Claudia Mischle)

From 28 May to 14 July 2012 the Service and its partner agencies removed almost 50 tons of debris from the lagoons and shorelines at Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, and Laysan Island. Half of the debris was derelict fishing gear and plastic objects found at Midway. Funding and logistics were provided by Coral Reef Ecosystem Division, the Papahānaumokuākea Marine National Monument, the NOAA Marine Debris Program, the Damage Assessment Remediation and Restoration Program, and the Fish and Wildlife Service. Surprisingly, almost none of the debris appeared to be related to the March 2011 Japan earthquake and tsunami, which was expected to be a major source (National Marine Fisheries Service 2012b).

Research and Management in the Main Hawaiian Islands

As noted previously, the population of monk seals in the MHI now numbers at least 150 and appears to be growing faster than any other portion of the specie' range. The seals' reoccupation of the MHI raises new and difficult research and management challenges. In many respects, assessing and monitoring seals in the MHI is even more difficult than in the NWHI because seals are so widespread throughout the MHI and researchers currently have limited access to the private island of Niihau where the largest number of MHI seals occur. Management challenges include interactions between seals and beachgoers, swimmers, divers, and recreational fishermen, many of whom do not exercise appropriate caution around seals and incidentally harass them. Some view seals as a nuisance or competitor for fish and deliberately attempt to injure or shoot them. Seals also interact with feral animals that can transmit lethal diseases (Aguirre et al. 2007).

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, a position that the Commission had long urged to be established. In 2009 the Commission held a review of the monk seal program as part of its annual meeting. In light of the amount of work that was needed to promote recovery in the MHI, the Commission recommended in a 10 May 2010 letter to the Service that the Regional Office hire or contract for additional staff to work exclusively on pressing MHI management issues, particularly the coordination of volunteers and development of targeted outreach efforts. The Service's 5 August 2010 reply advised the Commission that the Regional Office had begun the process of hiring a permanent full-time assistant monk seal coordinator and that three marine mammal response coordinators were also being hired on a contract basis. At the end of 2010 those positions had been filled and the office's budget for monk seal recovery work was increased to $1.7 million. Since 2010 the Service has maintained support for all of those positions, but as indicated below, due to budget cuts, they have had almost no operational funds to carry out needed projects.

A second matter of great importance in the MHI is support for work on monk seal conservation by staff of the Hawaii Department of Land and Natural Resources. The Commission had previously urged the Department to seek a grant under section 6 of the Endangered Species Act to support increased work on endangered species, including Hawaiian monk seals. In 2008 the Department did so and received a one-year grant, used in part to fund a monk seal response coordinator on Kauai. In its 10 May 2010 letters following the Commission's Hawaiian monk seal review, the Commission recommended that the Hawaii Department and the Service work together to complete an application for 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 submitted a three-year grant application and that the proposal had received high marks. Later that year, the Service awarded the Department a three-year grant totaling $1.55 million, which the Department was still using in 2012 to carry out monk seal-related work.

Development of a MHI management plan: In 2007 the Service adopted a revised Hawaiian Monk Seal Recovery Plan. Among other things, the plan identified the need for a MHI monk seal management plan designed as a comprehensive, long-term set of actions for specific MHI issues, such as population assessment, interventions for treating injured or distressed seals, coordinating response

efforts for seals on crowded beaches, public outreach, mitigating disease threats, and other management needs. Responsibility for developing that plan was assigned to the Service's new monk seal coordinator working in close cooperation with partner agencies and groups. Progress to complete the plan has been slow due to other pressing needs.

In September 2012 a new volunteer organization called the Monk Seal Foundation[2], working with the Service's regional office, hosted a three-day workshop for representatives from the state of Hawaii, federal agencies, the fishing community, and Native Hawaiian groups to review an initial draft framework for the MHI management plan prepared by the Service. To guide that review, the convener used the "Open Standards for the Practice of Conservation"[3] prepared by a consortium of conservation groups. The document lays out a step-by-step procedure for identifying and reaching agreement on conservation actions involving multiple stakeholders. The workshop was facilitated by a consultant with special training in the open standards approach. During the workshop, participants identified and ranked direct threats to Hawaiian monk seals and their habitat and developed a series of management strategies with targeted actions to address major challenges facing monk seal recovery the MHI. The goal of the workshop was not to create a draft plan but to provide community-based input into the identification of threats and recovery strategies to strengthen the Service's ability to carry out its planning process.

Following the workshop, the Service scheduled a series of meetings with community members and stakeholders to gather additional input into the MHI management plan. The meetings are to continue into 2013 with a final plan expected to be completed in late 2013 or early 2014.

Volunteer networks: Over the past decade, volunteers on most of the MHI have organized local networks to help meet monk seal conservation needs. Among other things, volunteers monitor seals on busy beaches and help keep beachgoers a safe distance from seals, raise money for public outreach materials and public service announcements, provide educational programs for local schools and visitors to the islands, report sightings of injured or distressed seals, and help gather data on sightings of individual seals for population monitoring. These networks have grown to include hundreds of committed residents who contribute thousands of hours to help collect monk seal sighting data and carry out routine but important activities to protect seals and educate the public about seals and their conservation.

In 2003 the Hawaii Department of Natural Resources, using funds provided by the Service, hired a monk seal coordinator on an ongoing basis to assist volunteers on Kauai. In 2010 and 2011 the Service expanded these efforts by hiring a marine mammal response coordinator to work with volunteers on the islands of Oahu and Maui and by providing grants to volunteer organizations, such as the Hawaiian Monk Seal Response Team Oahu and the new Hawaiian Monk Seal Foundation, to help carry out their work. In 2012 almost all of the operational funds available to the Pacific Islands Regional Office for monk seal work in the MHI (about $80,000) was used for grants to volunteer organizations for the purpose of training members, coordinating the deployment of people to tend hauled-out seals, purchasing basic supplies, and defraying expenses, such as gas needed to reach seal haul-out locations.

Interactions with fishing gear: With commercial fishing now prohibited throughout the NWHI, all recent fishery interactions have occurred in the MHI. Almost all of those interactions have involved recreational and subsistence fishermen. In 2010 one seal was found dead after becoming entangled and drowning in an illegal untended gillnet off Oahu. Another 11 seals were seen with hooks, thought to be from recreational fishing, embedded in their skin. Seven of those seals were captured and released after the hooks were removed, and the other four were subsequently seen 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 reported carrying hooks and one was seen entangled in a monofilament line. Of the hook seals, one had the hook removed by responders and was released, two required surgery (one of which died of infection following the surgery), and six others were resighted without hooks, having apparently shed them.

2 http://www.monksealfoundation.org

3 http://www.conservationmeasures.org/initiatives/standards-for-project-management

In 2012 a record 14 seals were found with either embedded or ingested hooks. In eight of those cases, seals were captured and hooks were successfully removed on site and in three other cases the seals were able to shed the hooks by themselves. The other three hooked seals were either found dead or had to be euthanized.

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 medical attention. Currently there is no facility dedicated to the care of injured or distressed monk seals in Hawaii. When possible, SeaLife Park and the Waikiki Aquarium have provided support to care for injured seals; however, their ability to do so is limited. The Kaneohe Marine Corps Air Base has also allowed the Service to construct shoreline pens on its property to hold seals temporarily. Nonetheless, none of these options can provide all the facilities needed to respond to the growing number of seals in the MHI.

To meet this need, the Marine Mammal Center, a non-profit organization headquartered in Sausalito, California, has been raising private funds to build a monk seal health care facility expected to cost $3.2 million. As of the end of 2012 the Marine Mammal Center had raised approximately $2 million, enough to begin building a small medical building and holding pools to maintain up to 10 seals. The facility will be located on lands owned by the National Energy Laboratory Hawaii Authority near the Kona Airport on the island of Hawaii and will be operated in cooperation with the Service's Pacific Islands Regional Office. In September 2012 a ceremony was held to mark the first phase of construction, which is to be completed in 2014. The Center is continuing its fundraising efforts to pay for the remainder of the seal hospital, which will include a laboratory, food preparation area, staff and volunteer support areas, and an open-air visitor and education center.[4]

Public outreach: Public outreach and education is urgently needed to promote monk seal recovery in the MHI. Because seals haul out on public beaches throughout the MHI to rest, breed, and molt, extensive efforts are necessary to inform visitors and residents on how to act around seals so the seals are not disturbed and neither people nor seals are injured.

There are many misperceptions about monk seals that have contributed to animosity against them by those who are strongly opposed to the presence of any seals in the MHI. Some people believe that monk seals eat hundreds of pounds of fish each day, are major competitors for commercially and recreationally valuable fish, and are responsible for declining stocks of fish targeted by fishermen. Several seals have been found dead in recent years, including two seals in 2012, with either gunshot wounds or blunt trauma wounds indicating they had been shot or bludgeoned to death by persons who presumably are opposed to the seals re-colonizing the MHI.

Studies show that an individual monk seal eats only about 15 pounds of fish and shellfish each day (Sprague et al. 2013). Although monk seals eat octopus, lobsters, surgeonfish, and some small snappers that make up a small component of the catch by commercial and recreational fishermen, most of the monk seal's diet consists of small reef fishes, such as triggerfish, wrasses, eels, and squirrel fish. As a result, even a population of several hundred monk seals would be highly unlikely to significantly affect commercial and recreational fishing opportunities. Other opponents assert that Hawaiian monk seals are an invasive species that never occurred in the MHI before the late 1900s and historically lived only in the NWHI. Given the seals' mobility and the obvious suitability of the MHI as monk seal habitat, it is unlikely that monk seals were limited to the NWHI before the arrival of Polynesians.

Resolving deliberate killings by people and disturbance by beachgoers requires an extensive public outreach program to provide accurate information to target audiences about monk seal biology, ecology, and conservation. In 2009 the Service contracted a professional public education firm to survey public perceptions and attitudes toward seals and help guide development of a more effective outreach program. Following a public opinion survey completed in 2011 (Sustainable Resources Group International, Inc. 2011a), the Service used the results to design a series of public education and outreach messages tailored to residents, fishermen, the military, and tourists (Sustainable Resources Group International, Inc.

4 http://www.marinemammalcenter.org/Get-Involved/awareness-campaigns/hms-latest-news/kona-hospital.html

2011b). To reach particular audiences, the report recommended the use of signs, guidebooks for visitors, social media, brochures and fliers, and oral presentations, and formal standardized training for volunteers who regularly interact with the public. To date, it has not been possible to act on most of the public outreach recommendations due to funding cuts.

One major effort, however, was initiated in 2012 to correct misinformation about predation. In cooperation with the National Geographic Society, scientists at the Service's Pacific Islands Fisheries Science Center initiated a community-based research project to document what monk seals eat in an effort to refute claims that the seals are major competitors for recreational and commercial fish species. The project enlisted local middle school and high school students on several islands in a study to attach Crittercams to monk seals to film their underwater movements and foraging patterns. Under the supervision of the Service's scientists, the students are helping to catch the seals, place cameras on the seals, and later recover the cameras. The students are then being asked to edit the raw footage (up to 180 hours of film for each deployment) by selecting clips showing seal interactions with their prey and other marine life and to present the results to their local community. In doing so, the project is encouraging local support for monk seal conservation and providing accurate information to local community members, including fishermen, who are often distrustful of information provided by government scientists. In 2012 cameras were attached to several seals on Molokai and at the end of the year, footage was being reviewed and edited by the students. As part of the project, Service scientists also provide local presentations describing the project, introducing the involved students, and presenting information on monk seal foraging behavior.

Aversive conditioning for seals in high-risk areas: In recent years, some seals have hauled out repeatedly on popular public beaches and become conditioned to interactions with people. This has led to some individual animals adopting behaviors that put them at risk of injury. In a few cases, seals have chased and bitten people in the water and on beaches. To address such problems, the Service has had to capture and move some seals multiple times, which has met 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.

The Commission has expressed support for these efforts and in May 2010 it recommended that the Service begin funding studies to develop and test promising techniques to dissuade seals from becoming acclimated to people or frequenting areas that could place them and people at risk. 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 as well as to identify other sites where seals should be discouraged from hauling out. Although the Service is studying behavioral modification options (possibly including aversive conditioning) in its efforts to develop an MHI research and management plan, to date only limited effort has been made to follow up on workshop recommendations. Those efforts include examining historical information on interactions between seals and people, developing forms for recording behavioral responses to human interactions, and collecting data on various hazing approaches. Other efforts have been postponed due to limited funding.

Inclusion of Hawaiian Monk Seals under the Purview of the Hawaiian Humpback Whale National Marine Sanctuary

The Office of National Marine Sanctuaries within the National Ocean Service has been an important partner in monk seal recovery. 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 includes waters in the Papahānaumokuākea Marine National Monument, and the Hawaiian Islands Humpback Whale National Marine Sanctuary. Among other things, the coral reef reserve provided funds for removing debris from waters off monk seal pupping beaches and studying shark ecology at French Frigate Shoals. The sanctuaries program also has assisted with logistical support for monk seal field teams in the NWHI. Managers of the Hawaiian Islands Hump-

back Whale Sanctuary help with public outreach in the MHI, reporting or participating in efforts to respond to seals on MHI beaches, and funding the salary of the state official responsible for overseeing state involvement in monk seal recovery work.

Because the humpback whale sanctuary's charter and management plan focus almost exclusively on protecting humpback whales, 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 by adding monk seal protection to its list of responsibilities. On 14 July 2010 the sanctuary office announced plans for a series of public scoping meetings throughout the MHI in August 2010 (75 Fed. Reg. 40758). The public scoping process included 10 statewide public meetings and resulted in comments from more than 12,300 people. In 2011 the Sanctuary Advisory Council created several working groups to address priority issues such as climate change, enforcement, Native Hawaiian uses, maritime heritage, and ecosystem protection raised during the public scoping period. The working groups were comprised of members of the Sanctuary Advisory Council, cultural advisors, local stakeholders, technical experts, and state and federal agency representatives. The working groups provided a final set of recommendations to the full council in January 2012. The council voted to forward all recommendations to the sanctuary management office for consideration in drafting a new sanctuary management plan. The sanctuary expects to release a draft revised management plan in 2013, with a final revised plan targeted for completion in 2014 (National Ocean Service 2013).

Expansion of Hawaiian Monk Seal Critical Habitat

Section 4(b)(2) of the Endangered Species Act requires the designation of critical habitat for species listed as endangered or threatened. In 1988 the Service designated critical habitat for Hawaiian monk seals. Within its boundaries were all beaches and nearshore waters out to the 20-fathom isobath around all of the NWHI except Midway. Since that designation was made, new information on the species' ecology and movements indicates 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 this information, several environmental groups petitioned the Service in July 2008 to designate additional critical habitat areas in both the NWHI and the MHI. The Commission's 2010–2011 report described the Service's 14 July 2011 proposed rule to expand critical habitat boundaries for the monk seals (76 Fed. Reg. 32026) both in the NWHI and in the MHI.

In support of its proposal, and as described in the previous annual report, the Service noted that the proposed areas included six types of essential physical and biological features necessary for the species' recovery. 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 in keeping with the species' critical status and the need to ensure its protection and therefore recommended that the Service adopt the proposed rule as written. The proposal elicited considerable controversy with many reviewers commenting that they considered the size of the proposed area to be excessive. On 25 June 2012 the Service announced that it was delaying a final decision on its critical habitat proposal for six months (77 Fed. Reg. 37867). The agency noted the need to consider the large number of comments received during previous public comment period. It also noted that there appeared to be substantial disagreement among reviewers about the sufficiency and accuracy of data and analyses used to support the proposed boundaries and that an extension in the decision deadline was needed to further analyze data and related concerns raised by state, federal, and other entities. As of the end of 2012, a final decision had not been announced.

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. On 24 October 2011 the Commission wrote to the Ser-

vice commenting on the draft statement and proposed plans. At the end of 2011 and into 2012 the Service was incorporating comments into a final programmatic environmental impact statement. The Service took no final decision on what further actions it would take to modify and expand monk seal recovery activities in 2012, but, as part of that effort, submitted permit applications to obtain authorization under the Endangered Species Act and the Marine Mammal Protection Act to cover various aspects of proposed activities. Given funding limitations, all new recovery alternatives except for expanded deworming treatments, whose costs are minimal, have been put on hold.

Florida Manatee
(Trichechus manatus latirostris)

The Florida manatee is a subspecies of the West Indian manatee (*T. manatus*). West Indian manatees range along the Atlantic coast from the southeastern United States through the Caribbean to northern Brazil, whereas Florida manatees occupy the northern limit of the species' range, almost entirely within U.S. waters. In most summers, at least a few Florida manatees range west to Louisiana and Texas and north to the Carolinas, but in winter they are confined almost exclusively to the southern two-thirds of the Florida peninsula as they are unable to survive long periods in waters colder than 18–20ºC (64–68ºF; Bossart et al. 2002). West Indian manatees, including Florida manatees, are listed as endangered throughout their range under the Endangered Species Act.

To survive winter temperatures, all Florida manatees—even those in southernmost Florida—retreat to small warm-water refuges on the coldest days (Laist and Reynolds 2005a). Currently, most manatees use 18 refuges formed by natural springs, power plant outfalls, or passive thermal basins (Figure III-8). Passive thermal basins are 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 cannot support manatees in particularly severe or prolonged cold weather. Thermal discharges, particularly springs that maintain constant temperatures of about 72º F (22ºC) or higher, generally provide the best protection against cold stress. Because of strong site fidelity to individual refuges or groups of refuges, Florida manatees occur in four relatively discrete

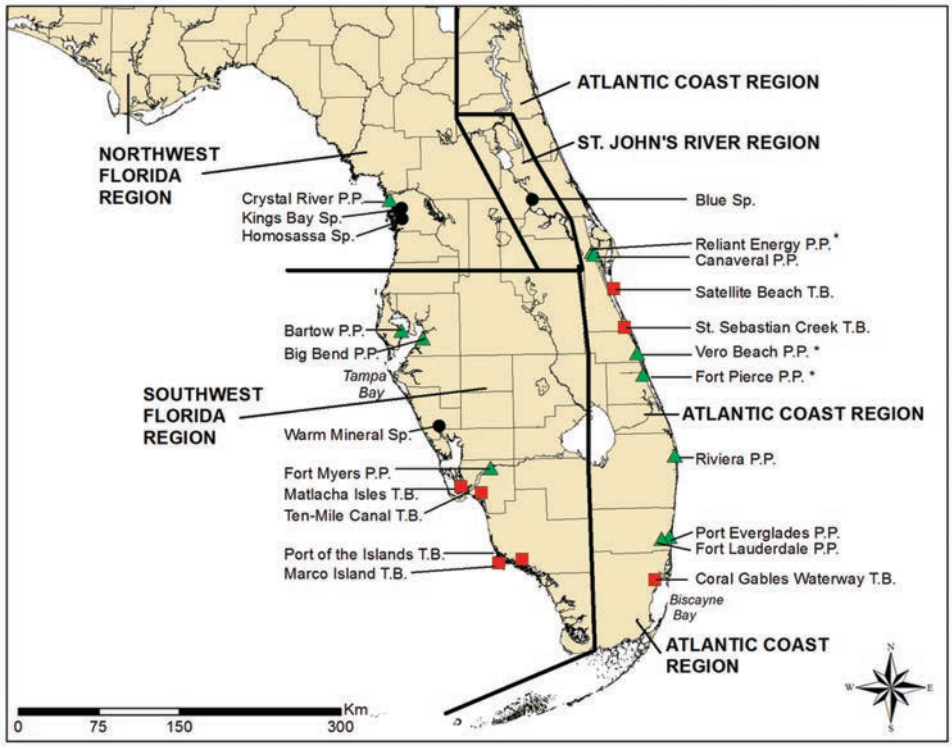

Figure III-8**.** Location of warm-water refuges with counts of more than 50 manatees and boundaries for the four Florida manatee subpopulations. (● = springs; ▲= power plants; ■ = passive thermal basins; * = power plants that have been retired, mothballed, or are no longer significant aggregation sites due to reduced operations)

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.

The Florida Fish and Wildlife Research Institute, part of the Florida Fish and Wildlife Conservation Commission, has organized annual statewide surveys to count as many manatees as possible since 1990. Those counts, conducted during winter cold fronts when most manatees can be found at warm-water refuges, provide a minimum estimate of population size. Unfortunately, because of variable temperatures and other conditions between years and the resulting uncertainty as to how many manatees are away from refuges at the time of any survey, statewide surveys have not been used to estimate total population abundance and are not a useful measure of year-to-year changes in population abundance. In general, however, the counts suggest that the population size has increased since the 1980s. A count in January 2010 during one of the coldest periods ever recorded in Florida tallied a record 5,076 manatees, with 2,780 of these on Florida's east coast and 2,296 on its west coast. That count far exceeded the previous record of 3,300 manatees in January 2001. The count in 2011 was 4,834 manatees; no count was made in 2012 due to unusually warm conditions throughout Florida that hinder high concentrations of animals at refuges.

Despite the apparent increase in numbers, the status and future of Florida manatees have been subject to uncertainty because of high numbers of manatee deaths recorded annually (Table III-2**)**. In most years, at least 25 to 30 percent of all manatee deaths have been attributed to human causes, principally collision with boats. From the 1970s to early 2000s the Fish and Wildlife Service and state of Florida regulated boat speed limits in many Florida waterways to protect manatees. Those actions have undoubtedly helped limit watercraft deaths, but a significant number of deaths still occur for reasons that may include boats exceeding speed limits in regulated areas, the occurrence of manatees and boats in unregulated areas, and speed limits in some areas that may not be low enough. In some years since the mid-1990s, large numbers of manatees also have died from exposure to brevetoxin—a biotoxin produced naturally by a microscopic dinoflagellate during red-tide events, principally in southwestern Florida.

Particularly high numbers of manatee deaths occurred between 2009 and 2011. In each of those years, the number of manatee carcasses found exceeded the previous annual record of 420 in 2006, producing an unprecedented three-year total of more than 1,600 deaths. The record number of deaths was due to a series of natural events. Toxins associated with a red tide event in 2009 killed at least 62 animals in southwestern Florida. Also, in all three years—but particularly in 2010 and 2011—cold stress killed unusually high numbers of animals. In 2010 when a record of 779 carcasses were found, at least 288 deaths were attributed to cold stress, and nearly 200 more carcasses that were unrecovered or too badly decomposed to assign a cause of death were suspected to have died of cold stress, making it likely that more than 450 manatees died of cold stress in that year alone (Barlas et al. 2011). Those deaths followed a 12-day cold spell in early January that was the coldest on record in Florida since 1940 (National Weather Service 2010). Unusually cold weather again in early 2011 caused at least 112 deaths. Prior to 2009 the highest number of confirmed cold-stress deaths in any one year was 52. Although long-term effects of high mortality levels over the three-year period are uncertain, it seems highly likely that the overall abundance of Florida manatees declined to some extent between 2009 and 2011.

In 2012 the number of manatee deaths fell to 396, a level more typical of that seen between 2000 and 2009. With no intense cold periods during the winter, cold-stress deaths declined to 28 animals, about average compared to the decade before 2009. However, signs of two other mortality events arose during the latter half of 2012. One was associated with another red tide event in southwest Florida resulting in nearly 30 manatee deaths; the other, which was just becoming apparent at the end of 2012, involved several tens of animals that died of an unknown natural cause in Brevard County in the Indian River Lagoon near Cape Canaveral on Florida's east coast. The cause of those deaths is under investigation but may be related to an extensive die-off of sea grasses that occurred in conjunction with

Table III-2. Annual number and percentage (in parentheses) of known Florida manatee deaths in the southeastern United States (excluding Puerto Rico): 1978–2012. Data provided by the Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission.

Year	Watercraft	Floodgates 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)	300 (39)	776
2011	89 (19)	2 (0)	3 (1)	78 (17)	112 (24)	179 (38)	460
2012	81 (20)	11 (3)	9 (2)	68 (17)	29 (7)	197 (50)	396

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, 100 in 2003, 93 in 2005, 64 in 2006, and 52 in 2007

a non-toxic algal bloom in the area in 2011. Both die-off events appeared to be ongoing and possibly intensifying at the end of 2012.

The U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission jointly lead Florida manatee research and management action, but they have been assisted by many other agencies and organizations. Recent actions related to key manatee conservation issues are discussed below.

Designation of the Kings Bay Manatee Refuge

Kings Bay is a warm-water refuge at the head of the Crystal River used by more manatees than any other natural spring in Florida. It is formed by a complex of natural springs that discharge water at 72ºF (22ºC) into the bay, which is roughly a mile across, as well as into the adjoining network of canals and waterways. The number of manatees using the bay in winter has increased steadily since the 1970s, and in January 2010 a record 565 manatees were counted at the site. Because of its clear, warm water and the presence of manatees, the bay has become a major attraction annually drawing tens of thousands of snorkelers and divers to swim with wild manatees (Figure III-9). Interactions between manatees and swimmers, however, have become a significant management problem in Kings Bay. Some divers chase 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 numbers of divers and manatees have increased. High-speed boat traffic allowed in portions the bay has also caused the death and injury of a dozen animals since 2000.

The Fish and Wildlife Service purchased several islands in Kings Bay and some of the adjoining submerged lands and in 1982 designated those holdings

Figure III-9. Florida manatees thermoregulating in the Three Sisters Spring, part of the Kings Bay complex of springs that form a natural warm-water refuge for manatees at the head of the Crystal River. (Photo courtesy of Cynthia Taylor, Sea to Shore Alliance)

as the Crystal River National Wildlife Refuge to protect manatees. The agency also designated seven small areas of the bay covering a total of about 45 acres as manatee sanctuaries within which all human access (e.g., boats, swimmers, and divers) is prohibited. Refuge staff members educate the public on proper conduct when diving with manatees and enforce rules prohibiting manatee harassment. In addition, the state of Florida established regulations covering most of the bay, requiring boats to use slow or idle speeds from 15 November though 15 March when manatees aggregate in greatest numbers.

The Marine Mammal Commission believes that harassment problems in the bay stem at least in part from a Fish and Wildlife Service policy that allows divers to touch wild manatees. Promotional videos showing divers petting animals also have likely fostered an expectation by some divers that they will be able to touch wild manatees, thereby encouraging them to chase animals. Although some manatees have become accustomed to approaching divers and even initiate contact with people, most animals shy away from divers and are disturbed from normal resting, feeding, and nursing behavior by close divers. Because divers cannot tell how animals will respond to their approach, the Commission has recommended on numerous occasions that the Service adopt regulations that prohibit touching manatees or approaching them closer than 10 feet. The Service, however, has not adopted the recommendation, believing the activity is harmless to animals and an insignificant cause of harassment. Nonetheless, the Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission are working to increase enforcement in an effort to prevent harassment incidents.

On 9 November 2010 the Service announced an emergency rule designating all of Kings Bay and its adjacent waterways as a manatee refuge (75 Fed. Reg. 68719). Its purpose was to reduce both harassment and manatee deaths caused by boat collisions, pending development of a permanent rule for that purpose. The emergency rule remained in place from 15 November 2010 to 15 March 2011 (the winter manatee season) in all waters in the bay and adjacent canals. It imposed a slow speed limit on boats throughout the refuge. It also provided refuge staff authority to alter boundaries of the seven manatee sanctuaries and to establish new sanctuaries on an ad hoc basis to protect concentrations of manatees in the bay. Finally, it identified and prohibited specific activities that harass 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. Because an increasing number of manatees have been using the bay year-round and several have been killed by boats in the summer when a high-speed water sports area has been allowed in part 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).

On 22 August 2011 the Marine Mammal Commission expressed its support for designating the bay as a permanent manatee refuge and establishing a year-round slow speed requirement. It also commended the Service for clarifying activities causing manatee harassment but noted that the rules still allowed divers to touch manatees not feeding or resting and to approach animals within a few inches. Believing that this would continue to encourage divers to chase animals in hopes of touching them and increase the chances of disrupting them, the Commission again recommended that the Service prohibit divers from petting, rubbing, or touching any manatees or approaching them closer than 10 feet. The Commission also pointed out that allowing people to touch wild manatees in any situation was inconsistent with marine mammal viewing guidelines adopted by Watchable Wildlife, Inc., which have been formally endorsed by the Service and other wildlife

management agencies. Those guidelines strongly advise marine mammal watchers to follow "hands off" and "keep your distance" standards.

Although the Service planned to have final rules in place for the winter manatee season beginning in mid-November 2011, controversy over the proposed boat speed regulations delayed action and a final rule was not adopted until 16 March 2012 (77 Fed. Reg. 15617). On 22 March 2012 the Service also wrote to the Commission providing a further response to its August 2011 comments on the proposed rule.

In both the notice of the proposed rule and its letter to the Commission, the agency noted that it had received many comments opposing the proposed year-round slow speed restriction for the bay, which would eliminate its water sports area, and expressed concern that more water skiers and high-speed watercraft would be displaced downstream into the Crystal River where its narrow width and heavy boat traffic would create boater safety issues. In response, the Service reconsidered boater safety effects in consultation with the U.S. Coast Guard and reexamined information on manatee distribution in Kings Bay during the summer months. Based on that effort, the Service determined that, by moving the water sports area, changing its effective date, and adding a prohibition on anchoring (which can attract manatees) in the new water sports zone, it could provide manatee protection without adversely affecting boater safety and still allow a high-speed water sports zone in the bay during the peak summer recreational season. Accordingly, the final rule moved the water sports area from the center of the bay to its northern end where relatively few manatees were present in summer months and prohibited anchoring in the area during its effective dates. The rule allows watercraft to use speeds up to 25 miles per hour in the new zone from sunrise to sunset between 1 June and 15 August, a period about 45 days shorter than allowed under current rules. At all other times, watercraft must use slow speed in all areas of the bay not otherwise limited to idle speed or where boat access is prohibited entirely.

With regard to the rule's provisions to define and manage harassment, the agency adopted its proposed measures and did not accept the Commission's recommendation to prohibit touching any manatees or establishing a 10-foot approach limit for divers. The agency stated it had no substantial evidence that simply touching manatees or approaching them within any specific distance would result in a "take" as defined in the Marine Mammal Protection Act (i.e., to harass, harm, pursue, hunt, shoot, wound, kill, capture, or attempt to engage in such conduct). Although the Commission's comments disagreed with the Service's assessment that it would be more difficult for enforcement officers to determine if a diver was reaching out to pet or scratch a manatee or chasing an animal closer than 10 feet than to enforce the other measures eventually adopted (e.g., "disturbing or touching a resting or feeding manatee"), the Service's letter provided no explanation as to how it reached that conclusion.

Status of Florida Manatees under the Endangered Species Act

The Endangered Species Act calls for a review of the status of each listed species every five years. Based on five broad listing factors, those reviews are intended to determine if a listed species should remain as it is listed, be reclassified, or be removed from the list of endangered and threatened wildlife. In April 2007 the Service completed a five-year review of the West Indian manatee (U.S. FWS et al. 2001). The review concluded that both the populations of Florida manatees and Antillean manatees (i.e., the only two subspecies of West Indian manatee) were either stable or increasing throughout most of their range and that the species no longer fit the Act's definition of endangered (i.e., "in danger of extinction throughout all or a significant portion of its range"). Accordingly, Service staff recommended that the species be reclassified as threatened under the U.S. Endangered Species Act.

To reclassify West Indian manatees as threatened, the Service must complete formal rulemaking to amend the Endangered Species Act list of endangered and threatened wildlife. As part of this process, the public must be afforded an opportunity to review and comment on the Service's reasoning and proposed change. In part, that rationale must demonstrate that identified threats to the species are under control and unlikely to cause a future decline that

would necessitate upgrading their status or relisting. In announcing results of the five-year review, the Service did not provide information as to when rulemaking action might proceed. The 2007 announcement also identified a number of conservation issues that needed to be resolved, including uncertainties regarding the future availability of warm-water refuges, future ongoing watercraft-related deaths, and a possible decline in the number of manatees in the southwestern Florida subpopulation. During each of the two years prior to completing the review, manatee deaths had reached record numbers with high levels of red tide-related deaths between 2007 and 2011. No further announcements were issued in 2012 with regard to plans for developing a reclassification proposal.

In 2011, however, the Service, in cooperation with the U.S. Geological Survey, began work to complete a new analysis of data on the Florida manatee's status and trend for the next five-year status review due to be completed in 2013. As those analyses were continuing, a representative of the Service announced during an October 2012 meeting of the Manatee Forum—a stakeholder group convened periodically by the Service and the Florida Fish and Wildlife Conservation Commission to update representatives of interested groups on the status of Florida manatee conservation—that it was initiating steps to prepare a proposed rule to reclassify the species. Although the new analysis of trends in the Florida manatee population had not been completed, participants at the meeting were advised that preliminary results suggested the 2007 recommendation regarding the downlisting of the species was still warranted.

Work on the new rule, however, was suspended indefinitely shortly after the meeting due to funding and staff limitations imposed late in 2012 by sequestration for all federal agencies, and uncertainty about whether the effects of the large manatee die-offs due to cold stress in 2010 and 2011 could be adequately assessed by the core biological model used to predict population trends without gathering additional data. At the end of 2012 it was unclear when the Service would resume its planned rulemaking for reclassifying manatees or whether new information on population trends would alter the proposed plans.

Ensuring Adequate Networks of Warm-water Refuges

To change the listing status of Florida manatees, the Service must assess the severity of threats to their survival. As noted above, virtually all Florida manatees, including those in southernmost Florida, require small localized warm-water refuges to survive the coldest winter weather, at least in some years (Laist and Reynolds 2005a). Uncertainty about the continued availability of such habitats is perhaps the greatest concern for those working to ensure the long-term survival of Florida manatees. Two functional categories of warm-water refuges have been identified: (1) discharges formed by the constant outflow of warm water, mainly from natural springs or power plants (Figure III-10), and (2) passive thermal basins. Because passive thermal basins have no natural or artificial input of warm water, they are subject to cooling in exceptionally cold weather or prolonged periods of moderately cold weather. Therefore, warm-water discharges are believed to provide the best protection against cold. There are currently fewer than 20 refuges where researchers have recorded recent maximum winter counts in excess of 50 animals. Nine of these are power plants, four are natural springs, and five are passive thermal basins (Figure III-8). Whereas most of the springs able to support such large numbers of manatees are in the northern part of the state, most of the passive thermal basins are in the southern third of the Florida peninsula where winter temperatures are milder.

Over a large part of Florida, manatees have come to rely on power plant outfalls to survive the winter cold. All of these plants were built more than 35 years ago. Whereas these older facilities are allowed to continue discharging thermal effluent, plants built after 1972 have been prohibited from doing so under provisions of the Clean Water Act in order to prevent thermal pollution. As a result, when the older plants are eventually retired and the outfalls eliminated, any plants built as replacements will not provide warm-water outfalls to support comparable numbers of manatees (Laist and Reynolds 2005a). Experience indicates that when a facility discharging warm water closes, many manatees accustomed to

Figure III-10. A winter aggregation of Florida manatees at the warm-water outfall discharge from the Florida Power & Light Co. power plant at Riviera Beach, Florida. (Photo courtesy of Cynthia Taylor, Sea to Shore Alliance)

using that site will remain nearby and suffer high levels of cold stress unless comparable refuges are near (Laist and Reynolds 2005b). In the case of some individual plants, this could affect up to 1,000 manatees.

In recent years, most plants serving as refuges for hundreds of manatees have been or are being modernized to burn natural gas instead of oil. The Fort Myers, Fort Lauderdale, and Bartow plants have already been converted, which will extend their operational lives and the outfalls for another 20 or 30 years. In the past four years, work has begun to modernize two other plants (the new Cape Canaveral and Riviera Energy Centers are scheduled for completion in 2013 and 2014, respectively), and in 2012 plans were announced to do so for the Port Everglades plant, scheduled for completion in June 2016. All of these plants except the Bartow plant are owned and operated by Florida Power & Light Co. (FP&L), which has been a staunch partner in manatee conservation. Because the renovation projects require demolishing old generating units and building new ones, plants can be shut down for periods of several years, temporarily eliminating their warm-water discharges. To provide a source of warm water at the two sites currently under construction, FP&L installed electric water heaters at a cost of approximately $4 million each. Over the past four years, those units have sustained hundreds of manatees accustomed to using those sites during the exceptionally cold winters in 2010 and 2011. Indeed, in 2010 a record high count of nearly 1,000 manatees was made at the Canaveral site while it was being warmed by the replacement water-heater. Other plants, however, most of which are used by far smaller numbers of animals, may soon be decommissioned because of outdated generating technology and high operating costs.

Although most power plants used by large numbers of manatees are expected to continue in opera-

tion for at least another 20 to 40 years, they will eventually be decommissioned. When that happens, it will significantly reduce the availability of warm-water refuges able to support large numbers of manatees and leave only natural springs and passive thermal basins to serve this function. It is unclear whether the springs and passive thermal basins as they now exist will be able to support current numbers of manatees. Most natural springs able to support large numbers of manatees are either located far from power plants, which means that manatees are unlikely to find them, or are otherwise inaccessible due to downstream dams, structural modifications for recreational use, or spring runs that have silted in due to erosion from public use, making them too shallow for manatees to navigate. Those springs that are accessible face threats of declining water flow due to exploitation of ground water aquifers that feed discharges and currently support far fewer manatees than do power plants. Passive thermal basins, as noted above, are subject to cooling during prolonged cold weather and therefore may not offer suitable refuge.

For these reasons, scientists and resource managers have been considering options to identify and secure regional networks of natural warm-water refuges that will be able to support manatees in current numbers after older power plants are eventually retired. Such options include improving manatee access to springs currently blocked by dams or other obstructions, ensuring spring flows do not decline due to excessive use of ground water, purchasing springs currently under private ownership, creating new passive thermal basins, and tapping warm-water aquifers to create small warm-water discharges. Recognizing that it has taken 50 years for manatees to develop their current dependence on power plant outfalls and that it will likely require several decades to implement options to improve availability of alternative refuges and provide time for manatees to learn new habitat use patterns, a long-term program is needed to develop networks of alternative refuges for each of the four regional manatee subpopulations.

In 1999 the Service convened a warm-water workshop with representatives from 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 regional networks of warm-water refuges, and developed plans for creating a temporary artificial refuge that could be put in place should a power company give short notice that it planned to close a power plant. However, progress was limited due to insufficient funding. To address the funding issue, the task force urged the Service and the Florida Wildlife Commission to create a revolving fund for supporting warm-water refuge projects by adding a small surcharge to Florida consumer electric bills. The Commission also wrote to both the Service and the Florida Wildlife Commission in April 2008 and again in September 2011 recommending the establishment of such a fund in cooperation with Florida power companies through a small rate surcharge. To date, the agencies have declined to pursue steps to arrange such a funding source, and the Service has disbanded its recovery team, including the task force.

Work to improve access to springs has therefore been limited. Perhaps the most significant accomplishment was the 2011 purchase by federal, state, and local agencies of property around Three Sister Springs, a major warm-water spring in the spring complex at Kings Bay (Figure III-9). Although title to the property is assigned to the Town of Crystal River, the property is being managed by Service staff at the Crystal River National Wildlife Refuge. The Florida Wildlife Commission has also dredged spring runs at both the Homosassa Springs a few miles south of Crystal River and Fanning Spring on the Suwannee River to improve manatee access to the spring discharges. In both cases, manatee use of the springs has increased significantly.

In September 2010 the Service and U.S. Geological Survey jointly convened a workshop to test the application of a "structured decision-making" process that could be used to develop a long-term strategy for securing networks of warm-water refuges to support manatees. The September meeting involved representatives of various agencies, stakeholder groups, and scientific organizations. Participants noted that the fundamental issue was

identifying and protecting 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. They concluded that it was necessary to increase the proportion of manatees using warm-water springs and passive thermal refuges and identified a range of possible actions to do so. These are described in the Commission's 2010–2011 report.

At a February 2011 follow-up meeting convened by the Service with recovery program partners, it was agreed that the agency should hold a series of structured decision-making workshops focusing separately on each of the four regional manatee subpopulations. The Service subsequently contracted with the Florida Wildlife Commission to develop a population model that could be used during the workshops to help predict the outcomes of various alternative actions and guide discussion at such workshops. In 2012 work on the model was largely completed. The model will be able to project population trends and growth under varying assumptions about expected levels of watercraft deaths, cold stress deaths, changes in carrying capacity, or other factors that might affect population growth.

To help compile and evaluate background information on current habitat-use patterns by manatees at warm-water refuges, the Marine Mammal Commission conducted a study examining winter habitat preferences of Florida manatees and their vulnerability to cold. The study, scheduled to be published in early 2013 (Laist et al. in press), examines the proportion of Florida manatees using different types of warm-water refuges, both statewide and in each of the four regional subpopulations. To accomplish this, the study uses manatee counts provided by the Florida Fish and Wildlife Research Institute from statewide synoptic surveys during the coldest winter periods between 1999 and 2011.

The study suggests that more than three-quarters of all Florida manatees occurred along the Atlantic coast (45.6 percent) and southwestern Florida (36.6 percent) regions where they rely most heavily on power plants. In contrast, less than a fifth of all animals are found in the northwest (12.8 percent) and upper St. Johns River (5.0 percent) regions where natural springs are the dominate refuge type. Statewide across all years, 48.5 percent of all manatees were counted at power plant outfalls, 17.5 percent were at natural springs, and 34.9 percent were at passive thermal basins or sites with no known warm-water features. During the exceptionally cold winter of 2010, however, preferences for power plants and springs increased substantially (to 63.2 and 18.3 percent), whereas counts at passive thermal basins and other sites with no known warm-water features (but which may have included unknown passive thermal basins) declined by nearly half to 18.4 percent. On a regional basis, manatee counts at power plants along Atlantic coast and in southwestern Florida totaled 66.6 and 47.4 percent, respectively, of the regional counts, but in the exceptionally cold winter of 2010 the figures increased to 82.9 and 67.5 percent, respectively. In northwestern Florida and the upper St. Johns River region where few or no power plant outfalls are available, the vast majority of animals were at natural springs (88.6 and 99.2 percent, respectively).

The study also examines the pattern of cold-stress deaths in the winter of 2010. The lowest rates of cold-stress deaths are found in the two regions where manatees depend on natural springs, whereas the highest death rates are in regions where manatees depend on power plants and passive thermal basins. One of the areas with the highest counts of cold-stress deaths in 2010 was in southwestern Florida where power plants provide the refuge used by most animals. Although power plants provide good protection against cold stress in most winters, in those years when air temperatures drop to unusually low levels, inland waters taken into power plants cool to such low temperatures that the power plants are unable to sufficiently heat the water to levels that would reliably sustain manatees. From that information as well as the general pattern of refuge use, the study concludes that natural springs provide the best protection against cold stress, passive thermal basins provide the least protection, and power plants provide an intermediate level of protection.

The study also concludes that to mitigate foreseeable losses of power plant outfalls, an increasing proportion of manatees will need to rely entirely on natural springs and passive thermal basins, but, given the limited ability of the latter to support manatees

in particularly cold years, primary management emphasis should be placed on improving access to natural springs. Whatever solutions are ultimately proposed, it is clear that cooperation of multiple partners will be required, as well as implementation in the near future and a long-term commitment for support.

As of the end of 2012, due to the impact of sequestration on agency budgets, the Service was unable make arrangements for convening the planned workshops, and at the end of the year it was not known when funding might become available for this purpose.

Southern Sea Otters in California (*Enhydra lutris nereis*)

In North American waters south of Alaska, the only sea otters that survived the era of commercial hunting were a few dozen 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 III-11). In 1977 the U.S. Fish and Wildlife Service listed the southern sea otter population as threatened under the Endangered Species Act.

Each spring the U.S. Geological Survey counts sea otters along their mainland range in California with the help of the California Department of Fish and Game, the 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 USGS 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). Based on the 2012 spring survey results, the three-year running average (calculated from 2010 and 2012 results as the 2011 survey was not completed due to poor weather conditions) was 2,792, an increase from 2,711 in 2010. However, the 2012 population average was lower than the 2,813 otters counted in 2009, and it appears that overall population growth has leveled off in the past five or six years with no net increase since 2006 (Hatfield and Tinker 2012) (Figure III-12).

Figure III-11. 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 lone otter at that location. (Modified from Hatfield and Tinker 2012)

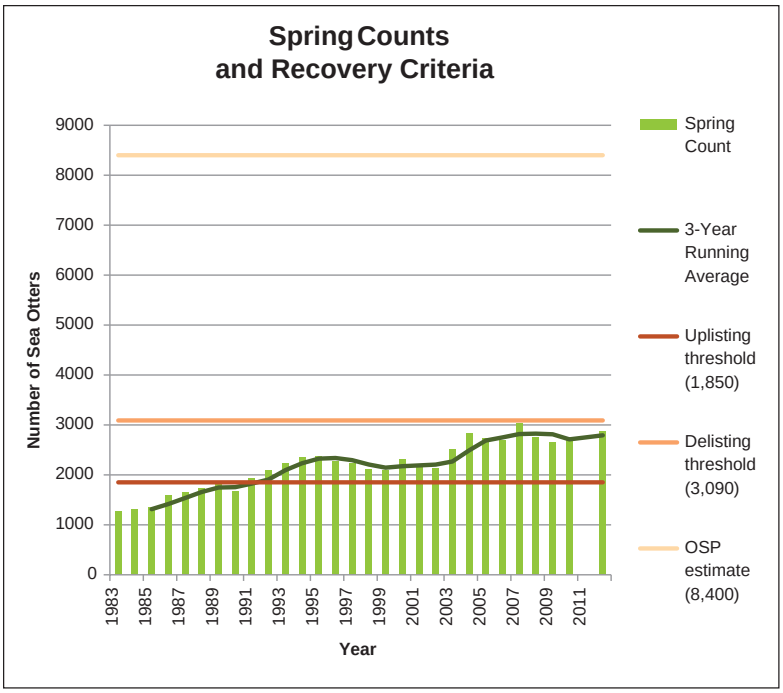

Figure III-12. Southern sea otter population levels and thresholds for Endangered Species Act listing or uplisting as defined by recovery plan criteria. (Source: Lilian Carswell, U.S. Fish and Wildlife Service)

The Service indicated during its 2011 Pacific Stock Assessment Review Group meeting that it might change future population survey methods to reduce costs. In response, the Commission recommended in its 3 August 2012 comments on the marine mammal stock assessment report (discussed below) that the Service calibrate any future survey methods against current methods to ensure that scientists have a basis for comparing results before and after the change in methodology to support an accurate record and assessment of population trends.

Although northern sea otter populations in Washington and parts of Alaska have increased at rates approaching 20 percent per year, the southern sea otter population in California has grown at a much slower rate, generally 5 percent or less (Estes 1990, U.S. Fish and Wildlife Service 2003). The reason(s) for this slower growth rate are unclear, 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 limited availability of foraging resources and other important habitat components. In the portion of their range between Estero Bay and Pismo Beach, California, sea otters are also experiencing a dramatic increase in mortality from shark attacks, which also is likely contributing to the lack of population growth (Hatfield and Tinker 2012). To better understand factors underlying the low levels of population growth, researchers from USGS and other federal, state, and non-profit partners are conducting a comparison study, tracking the diet, foraging behavior, diseases, births, and deaths of 90 radio-tagged otters that live in coastal areas of Monterey Bay (a high human impact/degraded area) and Big Sur (a low human impact/pristine area). This is part of the larger, ongoing Pacific Nearshore Ecosystem Study led by a consortium of federal, state, and non-profit partners, which focuses on six geographically distinct sea otter populations along the northern Pacific coast to determine factors that contribute to regional variation in population density and abundance (U.S. Geological Survey 2012).

Revised Southern Sea Otter Stock Assessment Report

On 9 May 2012 the Fish and Wildlife Service released its draft revised marine mammal stock assessment report for southern sea otters in California for public review and comment (77 Fed. Reg. 27246). The draft report provided new information on the abundance and trends of the southern sea otter population and human sources of mortality, including incidental take in fisheries. The Commission wrote to the Service on 3 August 2012, recommending the Service adopt the draft stock assessment report as written. The draft report noted that sea otters are believed to be incidentally taken in trap fisheries for crabs, lobsters, and finfish, although only four otter deaths in trap gear have been documented in California. The Commission recommended that the Service consult with the National Marine Fisheries Service and California

Department of Fish and Game to restrict trap openings to prevent the entrapment of sea otters in Dungeness crab, lobster, and finfish traps throughout the range of the southern sea otter. Recent research has documented maximum opening sizes required to exclude otters from traps with no loss of catch (Hatfield et al. 2011). Finally, the Commission recommended that, if such measures could not be adopted expeditiously, the Service should pursue the development of an industry-funded observer program to assess bycatch levels and identify alternative take reduction strategies. At the end of 2012 the Service had not issued a final version of its revised stock assessment report.

The San Nicolas Island Translocation Project

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

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 that are 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 an otter management zone. The zone, as designated by the Service, extended along the California coast from Point Conception southward (Figure III-13). 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. The Commission's 2010–2011 report provides a detailed history of this program and the status of the introduced otter population at San Nicolas Island through 2011.

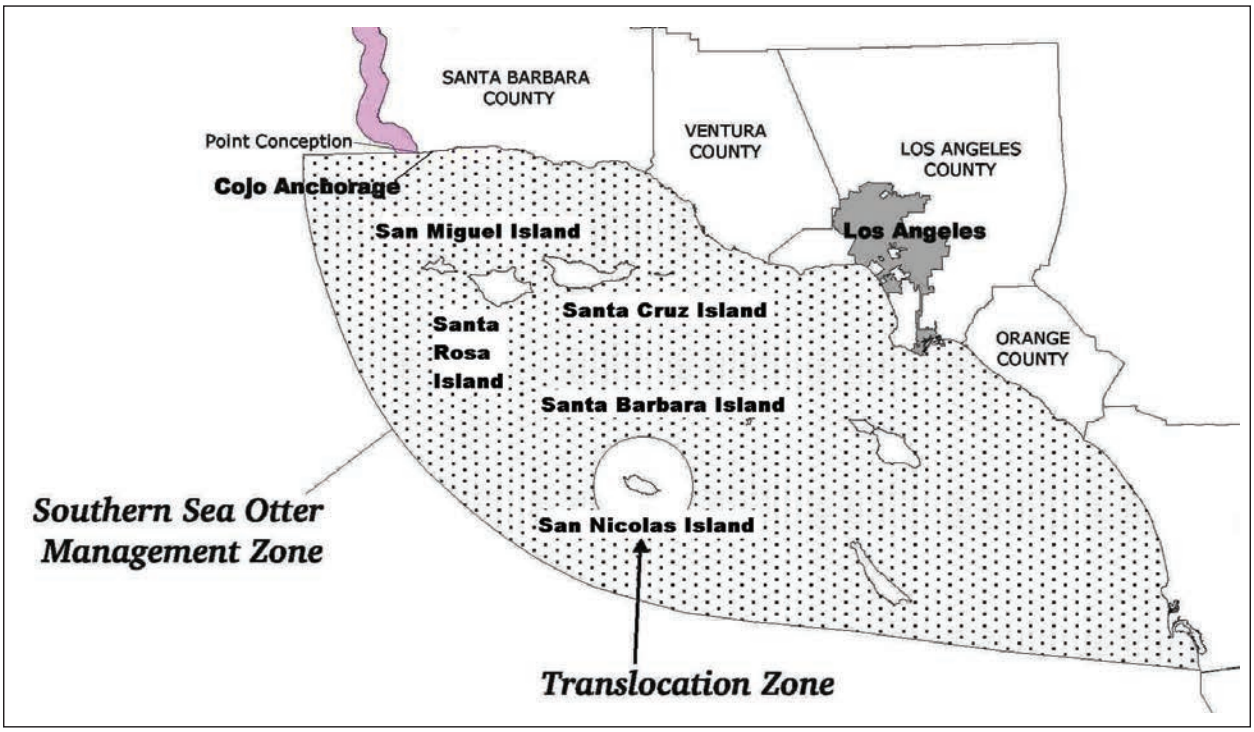

Figure III-13. Southern sea otter management zone established as part of the San Nicolas Island translocation program. (Source: U.S. Fish and Wildlife Service)

In accordance with a settlement agreement for a suit brought by the Environmental Defense Center and the Otter Project on 30 September 2009, the Fish and Wildlife Service published a notice in the *Federal Register* on 26 August 2011 (76 Fed. Reg. 53381) announcing 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 stated 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) to terminate the program. The Service published their analysis of the environmental consequences of this action, and alternatives to it, in a final supplemental environmental impact statement on 9 November 2012 (77 Fed. Reg. 67302; 77 Fed. Reg. 67362) and published a Record of Decision on 19 December 2012 (77 Fed. Reg. 75266) to remove the regulations that governed the translocation program and terminate it, effective 18 January 2013. Subsequent to that date, sea otters at San Nicolas Island would no longer be considered part of an "experimental population" but rather part of the threatened California population.

During 2012 several attempts were made to introduce or amend legislation to counter the Service's decision. In February 2012 Representative Elton Gallegly (R, CA-24) introduced H.R. 4043, the Military Readiness and Southern Sea Otter Conservation Act, which would allow the Secretary of Defense to create military readiness areas where incidental takes as defined under the Marine Mammal Protection Act and Endangered Species Act would not apply to southern sea otters. The bill also would require the Service to continue implementing the relocation strategy for the management zone. Similar attempts were made during the 2012 congressional appropriations process. A House version of the National Defense Authorization Act for Fiscal Year 2013 (H.R. 4310) was amended to include a provision that would exempt the military from incidental take prohibitions under the Endangered Species Act and the Marine Mammal Protection Act during military operations, as well as an exemption for any fishery operating south of Point Conception. No similar amendment was included in the Senate version of the bill, and the House amendment failed to move forward in the final version of the appropriations bill that would become public law in 2013. Thus, at the end of 2012 the new rule was to take effect on 18 January 2013.

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 whales. 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 North Pacific population was considered recovered and removed from the Endangered Species list in 1994, at which time the western population was listed separately under the Act.

Recovery of the Eastern North Pacific Gray Whale Population

The eastern North Pacific gray whale population had increased to more than 20,000 individuals by the 1990s (Laake et al. 2012 and references therein), under protections conferred by the Endangered Species Act, the International Whaling Commission's 1986 moratorium on commercial whaling, and Mexico's extension of protected reserve status to the gray whale calving lagoons and, for all large whales, to its territorial sea and Exclusive Economic Zone (Jones and Swartz 2009). At that point, many considered the population 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 con-

ducted the 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 North Pacific gray whale population 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 in Mexican waters. Service scientists have made 23 such counts since between 1967 and 2007. A reanalysis of all the estimates (Laake et al. 2012) 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, the population having declined sharply from exceptionally high mortality in 1999 and 2000 (Gulland et al. 2005; Figure III-14). In those years, hundreds of adult gray whales stranded along the entire migratory path from Mexico to Alaska (Figure III-15); some were emaciated, but others were not (Moore et al. 2001). Punt and Wade (2012) 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.

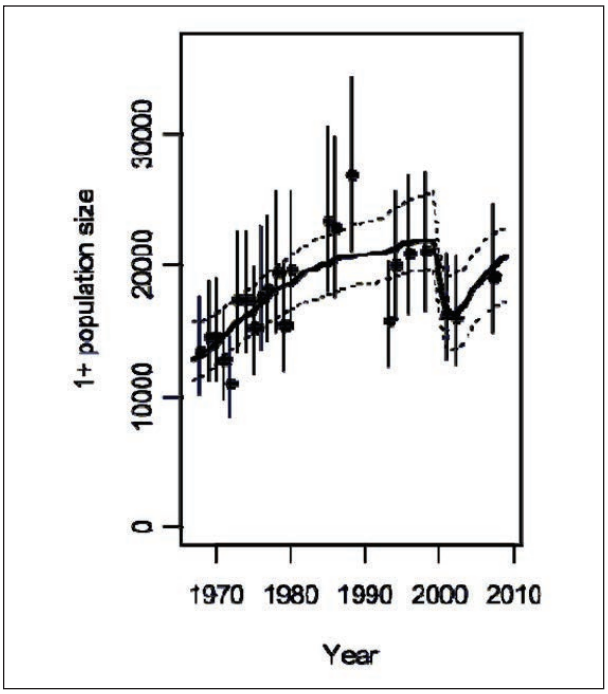

Figure III-14. Estimated abundance of eastern North Pacific gray whales from National Marine Fisheries Service counts of whales migrating past Granite Canyon, California. Error bars indicate 90 percent probability intervals. The solid line represents the estimated trend of the population with 90 percent credibility intervals as dashed lines. (Punt and Wade 2012)

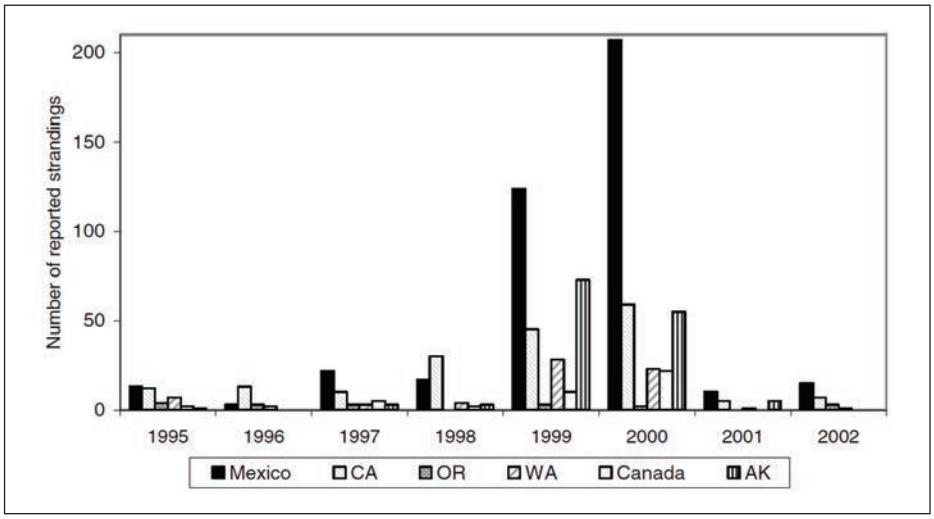

Figure III-15. Annual trends in reports of gray whale strandings by region, 1995–2002. (Gulland et al. 2005)

The poor condition of many of the stranded whales in 1999 and 2000 supports the idea that poor nutrition and starvation were contributing factors to the mortality event. The availability of food likely is one of the key factors that determine a population's carrying capacity. For example, through 2000, Perryman et al. (2002) found a significant positive correlation between the timing of sea ice retreat in the northern Bering Sea and estimates of calf production the following spring. They suggested that early access to foraging areas for pregnant gray whales provides greater feeding opportunities, resulting in whales that are in better condition and better able to sustain pregnancy and nurse a calf. There were likely several contributing causes to the gray whale mortality event, but the species' capability to feed on a variety of prey across their range provides a resilience not found in many other mysticete whales (Moore et al. 2001).

Results from surveys in some of the wintering lagoons of Baja California indicated that calf production may have been particularly high in 2011. Although preliminary results indicate that calf production declined slightly in 2012, it was likely still higher than 2007–2010 (International Whaling Commission 2012). Counts of northbound gray whale calves off central California found that after reaching a low estimate of 254 calves in 2010 (Perryman et al. 2011), calf production increased to more than 1,000 calves in 2011 and in 2012 (SWFSC unpublished data).

Ice cover over the Bering Sea in May 2012 was the most extensive in the past 20 years (1993 to 2012). Given the slow retreat of seasonal ice in 2012, the beginning of the feeding season was likely delayed, particularly for pregnant females who are the first to arrive in Arctic waters from the northward migration. The most recent year with an average ice cover value approaching that observed in 2012 was 1999. As noted above, 1999 was the first of two years with anomalously high gray whale mortality and a noticeable decline in the condition of many gray whales. However, aerial photographs of southbound gray whales collected late in 2012 indicated that the animals' condition was comparable to that in previous years and generally better than what was observed in 1999 and 2000. Although the impact of the heavy ice year in 2012 in the Bering Sea is not yet known, a drop in gray whale calf production was predicted for 2013 (International Whaling Commission 2012).

Population Discreteness and Subsistence Whaling

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 (see discussion in Chapter IV). The extent of this interchange and its implications are still uncertain. Additionally, photo-identification data have revealed the existence of a Pacific coast feeding group of gray whales that do not migrate into the Bering Sea in summer but instead remain along the West Coast of North America between northern California and the Gulf of Alaska throughout the summer and fall feeding season.

Between 31 July and 2 August 2012 the National Marine Fisheries Service convened a scientific task force to evaluate the currently recognized and emerging stock structure of gray whales in the North Pacific. The task force's charge was to provide an objective scientific evaluation of gray whale stock structure as defined under the Marine Mammal Protection Act and implemented through the National Marine Fisheries Service's Guidelines for Assessing Marine Mammal Stocks (National Marine Fisheries Service 2005). The final task force report is expected in early 2013.

Whatever the conclusions of the task force, the implications may be more important for the western population, which numbers about 130 individuals and is considered critically endangered (see Chapter IV). The western population is at risk from a number of factors, the most apparent being oil and gas development in the area around its primary feeding habitat off Sakhalin Island, Russia, and mortality in fishing gear (set nets) off Japan. It could also become

at risk from subsistence hunting if this were to begin in Washington and British Columbia, unless a means is found to distinguish whales from the two populations in real time. These topics are discussed in Chapter IV of this report in the sections on the western population of gray whales and on the International Whaling Commission.

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Chapter IV

INTERNATIONAL ASPECTS OF MARINE MAMMAL CONSERVATION AND MANAGEMENT

Section 108 of the Marine Mammal Protection Act directs 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 2012 the Commission was engaged in a number of international efforts to protect and conserve marine mammals, both through participation in international organizations and by working 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.

International Whaling Commission

The International Whaling Commission (IWC) was established under the International Convention for the Regulation of Whaling of 1946. Its purpose, as set forth in the text of the convention, is to provide for the proper conservation of the world's whale stocks and thus make possible the orderly development of the whaling industry. The IWC conducts a continuing review of the status of whale stocks and develops, adopts, and modifies conservation measures accordingly. No new parties joined the IWC in 2012, keeping the total number of member nations at 89 at the year's end. The 2012 meeting of the IWC was held in Panama City, Panama, on 2–6 July. The issues considered at this meeting and related issues are discussed in this section.

Future of the IWC

For more than a decade, 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 somewhat 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 catches. The scheme would establish not only the mechanisms for setting catch 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, rejoined 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 began a "scientific whaling" program in accordance with Article VIII of the International Convention for the Regulation of Whaling, which 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.

Another area of contention within the IWC is the establishment and recognition of whale sanctuaries. The IWC established the Indian Ocean Sanctuary in 1979 and the 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 Antarctic minke whales. In addition, Japan continues to conduct "scientific whaling" in the Southern Ocean Sanctuary despite opposition from many IWC members. There is also continued pressure for the establishment of additional whale sanctuaries in the South Atlantic and South Pacific, but the countries supporting this have been unable to garner the votes needed for their adoption.

At its 2007 meeting, the IWC began to address the problem of a polarized and ineffective commission. After considerable discussion, members agreed in general that the IWC should try to resolve the impasse. Toward this end, the parties established the Small Working Group on the Future of the IWC. This group was expected to propose possible compromises for consideration at the 2009 annual meeting, a deadline later extended until the 2010 meeting. The steps taken to craft a compromise solution were discussed in the Marine Mammal Commission's 2010–2011 report.

Consideration of the future of the IWC was the central issue addressed at the 2010 IWC meeting. After intense negotiations, it became apparent 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 moratorium would, in effect, legitimize 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 proposed monitoring and tracking provisions were appropriate or stricter than necessary. Absent consensus, 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. The chair of the IWC suggested that the parties concentrate instead on less controversial initiatives including efforts to prevent whale entanglement, expand cooperative research, build capacity in developing countries, and improve killing methods used in subsistence hunts.

At the 2011 IWC meeting, the United States and New Zealand noted the progress that had been

made leading up to the 2010 meeting and proposed a resolution calling on the parties to continue to work to resolve their differences. Ultimately that resolution was withdrawn. Rather, the member countries agreed to continue their dialogue regarding the future of the commission on an informal basis.

The parties again discussed the issue of the future of the IWC at the 2012 annual meeting. Some countries supported re-convening the Small Working Group to continue to try to forge compromise proposals. Others thought the charge to that group had ended in 2010 and felt that there currently was little point in resuming the effort. Anticipating the potentially controversial issues to be considered at the 2012 meeting, some countries expressed the view that antagonism could be avoided if parties refrained from seeking votes when consensus was lacking. Others, including the chair, agreed that reaching consensus should always be the desired outcome, but that voting was appropriate when consensus was not possible. Consistent with that view, several of the decisions at the 2012 meeting were made by consensus, but other more controversial issues were put to votes. As discussed below, some of the issues that had been part of the proposed compromise considered at the 2010 meeting (e.g., the creation of a South Atlantic Whale Sanctuary, Japan's small-type coastal whaling, and switching from annual to biennial commission meetings) were considered independently at the 2012 meeting.

Whale Sanctuaries

The IWC currently has in place two whale sanctuaries where commercial whaling is prohibited. The Indian Ocean Sanctuary, established in 1979, covers the entire 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, and the matter has been considered at several subsequent IWC meetings. Although favored by a majority of parties, including the United States, the proposal has yet to garner the required three-quarters majority vote for adoption.

As expected, Brazil, along with Argentina, South Africa, and Uruguay, again introduced a South Atlantic Whale Sanctuary proposal at the 2012 IWC meeting. The proposed sanctuary would include all Atlantic waters south of the equator, southward to the edge of the Southern Ocean Sanctuary and eastward to the edge of the Indian Ocean Sanctuary. The proponents of the sanctuary believed that its creation would support conservation and non-lethal use of whales in that area. Opponents argued that, because of the moratorium on commercial whaling, there was no need for additional sanctuaries, and that this particular proposal lacked sufficient scientific support and did not include measurable objectives. When put to a vote, the measure failed to secure the necessary three-quarters majority—39 members voted for the proposal, 21 against, and 2 abstained.

Aboriginal Subsistence Whaling

Aboriginal subsistence whaling is managed under separate provisions of the whaling convention and is unaffected by the moratorium on commercial whaling. 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 six stocks for a five-year period: the Bering/Chukchi/Beaufort Seas stock of bowhead whales (*Balaena mysticetus*); the eastern North Pacific stock of gray whales (*Eschrichtius robustus*); the stocks of common minke (*Balaenoptera acutorostrata*), fin (*Balaenoptera physalus*), and bowhead whales off Greenland; and the stock of North Atlantic humpback whales (*Megaptera novaeangliae*) off St. Vincent and the Grenadines. In addition, as discussed in the Marine Mammal Commission's 2010–2011 report, the IWC subsequently authorized subsistence whaling of humpback whales off West Greenland beginning in 2010. Because the catch limits were to expire at the end of the year, renewing the aboriginal subsistence whaling catch limits at the 2012 IWC meeting was a top priority for the United States and other countries that engage in such whaling.

Table IV-1. Alaska whales taken for subsistence purposes, 2012

Species/Stock	United States	Russia	Greenland	St. Vincent
	2012	2012	2012	2012
Bowhead Whale	69			
Gray Whale		143		
Fin Whale				
Minke Whale				
-*West Greenland Stock*			148	
-*East Greenland Stock*			4	
Humpback Whale			10	2

The number of whales taken during 2012 for subsistence purposes is shown in Table IV-1.

Whaling by Alaska Natives: Bowhead whales are an important food source for inhabitants of remote areas of Alaska, 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. For the period 2008 to 2012, the IWC authorized subsistence hunters to 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 could be carried over into subsequent years.

On 10 April 2012 the National Marine Fisheries Service published a notice (77 Fed. Reg. 21540) announcing the aboriginal subsistence whaling quota of bowhead whales for 2012. At the end of 2011 there were 15 unused strikes available to be carried forward to 2012. Thus, the strike limit for bowhead whales in 2012 was 82 (67 + 15). Of these, 75 strikes were allocated to hunters in Alaska and 7 to hunters in Russia. During 2012 Alaska Natives used 69 strikes, successfully landing 55 whales, for a hunting efficiency of about 80 percent. This success rate is comparable to that achieved from 2002–2009 and is a considerable improvement over the poor hunting season in 2010 when only 63 percent of the stuck whales were landed. Hunters in Russia did not use any of their authorized strikes in 2012.

Prior to the 2012 IWC meeting, the Service issued a draft environmental impact statement for issuing quotas to the Alaska Eskimo Whaling Commission for subsistence hunting of bowhead whales for the years 2012 through 2017 or 2018 (it was uncertain whether the IWC would consider a five-year or six-year authorization since it also was making a decision on a possible switch to a biennial meeting schedule at the same meeting).

The Marine Mammal Commission commented on the draft environmental impact statement on 31 August 2012. Since the 2012 IWC meeting had taken place by this time, the Commission had the benefit of considering its outcomes in developing comments. The Commission recommended that the Service adopt the alternative that tracked the six-year authorization agreed to by the IWC, and which retained the provision allowing up to 15 unused strikes to be carried forward to subsequent years. One of the issues that had been considered in the draft statement was whether the United States could authorize continued whaling if authorization was not received from the IWC. The Commission noted that authorizing subsistence whaling absent explicit authorization from the IWC, even if legally defensible, is fraught with difficulties from a policy perspective. Because such an alternative should be considered only as a last resort, and as the IWC had approved a new authorization, the Commission recommended that further consideration of this alternative be dropped from the final environmental impact statement. Issuance of a final environmental impact statement was pending at the end of 2012.

Whaling by the Makah Tribe: 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.

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 (whales that remain in areas between northern California and northern British Columbia during the summer, rather than migrating north to the Bering or Chukchi Sea) warrants consideration as a separate management unit. Lastly, evidence from satellite telemetry, photo-identification, and genetic studies indicated some movement of gray whales from the endangered western North Pacific population to the U.S. West Coast and breeding grounds in Baja California. In light of this new information, the Service published a notice on 21 May 2012 (77 Fed. Reg. 29967) that it was terminating the 2008 draft environmental impact statement and announcing its intention to prepare a new draft statement. The Service also requested public comment on five preliminary alternatives that it was considering to include in the new statement.

The Marine Mammal Commission submitted comments on 27 August 2012, supporting the Service's decision to prepare a new draft environmental impact statement. One comment concerned the tension between the Service's proposed adaptive management approach and the need for management measures to be adopted through formal (adjudicatory) rulemaking. Although the Commission advised the Service to retain sufficient flexibility in its environmental review to allow it to respond to new information or changed circumstances (e.g., by issuing supplemental analyses), it cautioned that the adaptive management alternative under consideration by the Service could prove difficult to implement. The Commission believed that the Service needed to assess how that alternative could be implemented consistent with the procedural requirements of the Marine Mammal Protection Act and to identify safeguards that could be included to ensure that parties to the rulemaking are included in post-rulemaking decisions. The Commission also recommended that the draft environmental impact statement include an alternative that would define the hunting season to avoid times when whales from either the Pacific Coast Feeding Group or the western Pacific stock are most likely to be present. Lastly, the Commission recommended that the Service discuss the possible implications of the decision in *Kokechik Fishermen's Association* v. *Secretary of Commerce*. The ruling in that case found that a permit authorizing the taking of marine mammals from healthy stocks could not be issued if there was a sufficiently high probability that marine mammals from a depleted stock (such as the western Pacific stock of gray whales) also would be taken.

Throughout much of 2012 the Service undertook various studies to support preparation of the new environmental impact statement and the related rulemaking. The Service convened a scientific task force to "evaluate the currently recognized and potentially emerging characterization of gray whale stock structure." Among the crucial questions that the task force sought to address was whether the Pacific Coast Feeding Group and the western North Pacific population qualify as separate stocks under the Marine Mammal Protection Act definition. A report due to be completed in 2013 will consider whether the Pacific Coast Feeding Group is within its optimum sustainable population level. Another study expected to be published early in 2013 was assessing the probability that a gray whale from the western Pacific population might be taken if a Makah whale hunt is authorized.

2012 authorizations: Going into the 2012 IWC meeting, the United States was concerned that prowhaling countries might seek to block the adoption of new aboriginal subsistence catch limits, particularly the one authorizing the taking of bowhead whales by Alaska Native hunters, as a way of exact-

ing concessions from the United States on unrelated issues. In 2002 these countries successfully blocked adoption of a renewal of the bowhead whale catch limit although a five-year catch limit was ultimately approved at a special IWC meeting later that year. In 2007 countries in favor of commercial whaling threatened to block the adoption of a five-year aboriginal subsistence whaling catch limit for bowhead whales. However, in recognition of the emerging efforts to improve operation of the IWC and resolve the significant issues facing it, the members supportive of commercial whaling acquiesced and approved new bowhead whale catch limits, which were adopted by consensus.

At the 2011 IWC meeting the United States had laid the groundwork for seeking new catch limits for bowhead and gray whales in 2012. The United States held an informal information session for other countries concerning U.S. subsistence whaling. In addition, 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 withdrew 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 the four that engage in subsistence whaling.

Prior to the 2012 IWC meeting, the United States approached the other subsistence whaling members to try to forge a united proposal for a straight renewal of pre-existing catch limits for an additional five years (or six if the IWC decided to switch to biennial meetings). Russia and St. Vincent and the Grenadines agreed with this strategy, and the three counties proposed a schedule amendment to set subsistence catch limits for the six-year period 2013–2018 at the same annual level as authorized over the preceding five years. Although there was unanimous support for the proposals concerning the hunting of bowhead and gray whales by the United States and Russia, some members, primarily from Latin America, voiced concern over the proposed extension of the authorization for St. Vincent and the Grenadines. They contended that hunting in St. Vincent was not carried out by aboriginal people and was closer to commercial than to aboriginal subsistence whaling. Those countries thought that the three proposed catch limits should be considered separately. Faced with a lack of consensus on the proposed amendment as a whole, and opposition to dividing the proposal from its three proponents, the chair called for a vote. The IWC adopted the measure by the required three-quarters majority, with 48 votes in favor, 10 against, and 2 abstentions.

Denmark, on behalf of Greenland, declined to join in the proposal put forward by the other three subsistence whaling countries because it had decided to seek an increase in the numbers of whales it could take. At the 2007 meeting, the IWC had approved annual catch limits of 200 common minke whales, 2 bowhead whales, and 19 fin whales in West Greenland and 12 common minke whales in East Greenland, with the proviso that the catch limit for minke whales off West Greenland be subject to annual review by the Scientific Committee and the taking of bowhead whales in a given year be contingent on a determination by the Scientific Committee that the take would be unlikely to endanger the stock. In 2010 the IWC reduced the allowable catch of minke whales in West Greenland from 200 to 178 based on concerns by the Scientific Committee over the sustainability at the higher catch limit. Concurrently, the IWC authorized the catch of 9 humpback whales and reduced the catch of fin whales from 19 to 16 (and conditioned it so Greenland would voluntarily reduce the fin whale catch from 16 to 10 for each year from 2010 to 2012). Under the proposal introduced at the 2012 meeting, Denmark, on behalf of Greenland, sought an increase in the catch limit for humpback whales from 9 to 10 and a reinstatement of its full catch limit of 19 fin whales for the six-year period beginning in 2013. Denmark contended that the cur-

rent authorization was insufficient to supply Greenlanders with the 670 metric tons of whale meat they require each year.

Although many countries opposed this proposal, the United States supported it on two grounds. First, it noted that the IWC's Scientific Committee had determined that the proposed catch limits would not harm the target whale populations. Second, it agreed that the use of whale products by hunters in Greenland satisfies the definition of aboriginal subsistence whaling adopted by the IWC. When put to a vote, Denmark's proposal failed to pass, with 25 votes for the proposal, 34 against, and 3 abstentions.

Several countries encouraged Denmark to follow the lead of the other aboriginal subsistence whaling countries and seek a straight reauthorization of the existing catch limits, but Denmark declined to do so. As such, at the end of 2012 it remained unclear what action Denmark and Greenland would take. Among the possibilities were for them to seek reconsideration by the IWC at a special meeting or through a postal vote, for Greenland to continue its whaling activities notwithstanding the lack of new approved catch limits from the IWC, or for Greenland and Denmark to withdraw from the organization.

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 1,286 common minke whales in 2012, the same number authorized in 2010 and 2011. Although Norway usually takes only about half that number, it believes that the adopted quota is scientifically justified. Iceland established annual whaling quotas of 100 common minke whales and 150 fin whales for each year from 2009 through 2014 although those catch limits were raised to 337 and 154, respectively, in 2011. The numbers of whales taken by Norway and Iceland during their 2012 commercial hunts are provided in Table IV-2.

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 below, 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 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. Japan is the only country currently engaged in such "scientific whaling," with ongoing programs in Antarctic waters and in the North Pacific. Iceland began scientific whaling in 2003 but discontinued it in 2007. At the 2012 IWC meeting, the Republic of Korea announced

Table IV-2. Whales taken for scientific research and in commercial whaling operations, 2012*

	Minke Whale	Fin Whale	Bryde's Whale	Sei Whale	Sperm Whale
	2012	2012	2012	2012	2012
Scientific Research Whaling					
Japan					
North Pacific	184		34	100	3
Southern Ocean	103				
Commercial Whaling					
Iceland	52				
Norway	464				

*Whaling in the Southern Ocean is conducted during the austral summer. The figure presented for Southern Ocean whaling is for the 2012-2013 whaling season.

that it was considering establishing a scientific whaling program to study minke whale stocks within its waters. Korea indicated that it intended to submit a detailed research plan, as required under IWC procedures, for consideration at the 2013 Scientific Committee meeting. However, no such plan had been submitted by the 3 December 2012 filing deadline. Shortly thereafter, Korean officials explained that Korea had decided not to pursue a lethal whaling program but rather would continue to conduct non-lethal research.

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 non-lethal 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.

Australia has been a particularly strong opponent of scientific whaling. In 2009 it provided initial funding for the Southern Ocean Research Partnership, an initiative to pursue non-lethal research on whale stocks in the Southern Ocean. Then, in 2010 Australia instituted proceedings within the International Court of Justice alleging that Japan's whaling activities in the Southern Ocean violate international law. Arguments in the case are expected to be heard beginning in June 2013.

Japan issued special permits for scientific whaling in Antarctic waters during the 2012–2013 season that authorized the lethal taking 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 2012–2013 are shown in Table IV-2. As was the case in 2011–2012, whaling by Japan occurred during fewer days than planned during the 2012–2013 season because of interference with its activities by anti-whaling activists and concerns about the safety of its whaling crews.

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 generally support 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 behavior that could endanger human life and pose environmental risks to 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, to prevent and suppress activities that place human life and property at risk. At the 2012 IWC meeting, Japan again voiced concern that measures taken to date have been ineffective in stemming these "violent protests and acts of sabotage" against its fleet.

Japan also has availed itself of U.S. courts in an effort to gain relief from protests against its whaling activities. The Institute of Cetacean Research filed suit in U.S. district court seeking an injunction against Sea Shepherd's interference, claiming that the organization's activities constituted piracy and violated international standards applicable to vessel safety at sea. The district court judge who heard the case declined to enjoin those activities. However, the Ninth Circuit Court of Appeals, in an order issued on 17 December 2012, issued an injunction pending appeal prohibiting the Sea Shepherd Conservation Society and any party acting in concert with it from attacking or endangering the safety of Japan's whaling vessels in the Southern Ocean. Specifically, the court ordered Sea Shepherd's vessels to remain at least 500 yards away from the whaling vessels.

Japan's special permit for scientific whaling in the North Pacific during 2012 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. An additional concern is the inclusion of possible catches of common minke whales from the J stock as part of Japan's proposed coastal whaling (discussed below). The numbers of whales caught in the North Pacific by Japan under its special permit during 2012 are given in Table IV-2.

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. Japan tried to obtain approval for such whaling as part of the compromise proposal on the future of the IWC considered at the 2010 IWC meeting and again raised the issue at the 2012 meeting. The proposal did not include specific catch limits, and Japan expressed a willingness to negotiate a quota with member countries. As in the past, the United States opposed Japan's proposal, noting its concern about the already large removals of minke whales in the waters off Japan and Korea. The United States also recognized the commercial nature of the proposed whaling and confirmed its continued support for the IWC's moratorium on commercial whaling.

Recognizing that consensus could not be reached, Japan decided to refrain from seeking a vote on its proposal. However, it indicated intent to present a new proposal at the next IWC meeting.

Conservation Issues

The United States has been a leader 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. The United States remains extremely active in both the Scientific Committee and the Conservation Committee and, at the 2012 IWC meeting, agreed to serve on nine intersessional working groups focusing mainly on these initiatives.

In 2011 the National Ocean Service established a detail for one of its employees 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 has led seminars and training sessions in several countries, most recently with a focus on Latin America and the Caribbean. The Marine Mammal Commission wrote to the head of the National Oceanic and Atmospheric Administration on 27 August 2012 to praise those efforts and to support extension of the detail. In doing so, the Commission noted the value of this detail not only in saving individual whales but also in helping pro- and anti-whaling countries find common ground. The detail was extended through 2013.

At its 2012 meeting, the Whaling Commission took several actions related to conservation. It agreed to appoint a ship strike coordinator to compile worldwide ship strike data. The IWC also highlighted the threats to cetaceans posed by marine debris and endorsed the idea of convening a workshop on this topic in 2013. In addition, the IWC endorsed a general strategy to address interactions between whales and marine energy development (e.g., wind farms, tidal energy, and wave energy converters).

The IWC adopted one resolution by consensus at the 2012 meeting that recognized the importance of research into the impact of marine environmental degradation on the health of cetaceans and on people who consume them. Among other things, the resolution called on the IWC to work with the World Health Organization to examine information on contaminants in whales and to provide updated advice to consumers.

Status of Whale Stocks

The IWC and its Scientific Committee routinely review the status of whale stocks. At its 2012 meet-

ing, the Scientific Committee completed its assessment of Antarctic minke whales, which suggested a non-statistically significant decline of about 30 percent between 1985 and 2004. The committee intends to undertake further work to investigate this apparent decline. Assessments of several other stocks, including Southern Hemisphere stocks of humpback, blue, and right whales, are ongoing. The Scientific Committee gave particular attention to the critically endangered western North Pacific stock of gray whales and highlighted the need for a better understanding of stock structure given the recently detected migrations of some whales from their feeding grounds off Sakhalin Island (Russia) to the eastern North Pacific. The committee also expressed concern for North Pacific and North Atlantic right whales and welcomed measures taken by the United States to reduce ship strikes (see discussion in the North Atlantic right whale section of Chapter III). In addition, the Scientific Committee endorsed the five-year research proposal for the North Pacific Ocean Whale and Ecosystem Research (IWC-POWER) project, which is designed to collect information on the abundance and trends of large whales in the North Pacific.

Small Cetaceans

Although parties to the IWC have differing views as to the organization's legal authority to manage small cetaceans, many member countries choose to address issues involving these species, particularly within the IWC Scientific Committee. At its 2012 meeting, the Scientific Committee's sub-Committee on Small Cetaceans focused on a review of the biology, ecology, status, and conservation issues concerning the 10 species of beaked whales (family Ziphiidae) that inhabit the North Pacific Ocean and the northern Indian Ocean. Of these 10 species, 8 are considered "data deficient" by the International Union for Conservation of Nature (IUCN), so it is not surprising that several research needs were identified. The committee recognized military sonar and seismic surveys as particular threats to beaked whales and recommended that deployment of these sound sources be avoided in important beaked whale habitat. Toward this end, the committee further recommended that collaborative international efforts be made to identify such habitat. Concern was also expressed about the possible adverse impact on beaked whales from marine debris, entanglement in fishing gear, and large-scale environmental change. The committee recommended studies to investigate these threats.

As in the past, the IWC and its Scientific Committee stressed the need to take immediate steps to prevent extinction of the vaquita (*Phocoena sinus*). The Scientific Committee endorsed the report and recommendations made by the International Committee for the Recovery of the Vaquita (see discussion in the vaquita section of this chapter). The committee also made two additional recommendations—expedited adoption of specially designed small-scale trawls as an alternative to gillnets for shrimp fishing and removal of all gillnets from the vaquita's entire range.

Other small cetacean issues that received the attention of the IWC and its Scientific Committee included unsustainable bycatch of some populations of harbor porpoises (*Phocoena phocoena*) in Europe and of franciscana dolphins (*Pontoporia blainvillei*) in Brazil, the intentional killing of botos (*Inia geoffrensis*) and tucuxis (*Sotalia fluviatilis)* for use as bait in the Amazon Basin, and bycatch problems involving Hector's dolphins (*Cephalorhynchus hectori*) in New Zealand.

Biennial Meetings and Creating a Bureau

One element of the chair's proposal on the future of the IWC considered at the 2010 meeting was to switch from annual to biennial commission meetings. This proposal was considered as a stand-alone matter by the IWC at the 2012 meeting, where it was adopted by consensus. The change in meeting frequency is expected to reduce costs to member countries. Consistent with the new schedule, the IWC will not meet again until 2014. Corresponding changes were made to other aspects of the commission's operations, such as the terms of the chair and vice-chair, transition to a two-year budget cycle, and setting aboriginal subsistence whaling catch limits to coincide with the new meeting schedule. As noted above, the catch limits adopted at the 2012 meeting extend for six years, rather than five years, a change supported by the Scientific Committee.

Recognizing the value of the Scientific Committee and the need for more frequent meetings, the IWC decided to retain an annual meeting schedule for that committee, which will continue to meet during May or June each year (at least 100 days before the IWC meeting in even-numbered years). Other committees will adhere to the new biennial schedule and meet in conjunction with the IWC although they would not be precluded from conducting intersessional work.

Because the IWC will meet less frequently, it decided to create a bureau to provide advice to the chair and the secretariat on an ongoing basis. Among other things, the bureau will help prepare for commission meetings, review the progress of work undertaken by subcommittees, and assist the chair at commission meetings. The bureau will not be a decision-making forum but is intended to assist the IWC with management processes and review of financial matters. The bureau consists of seven members: the chair and vice-chair of the IWC, the chair of the Finance and Administration Committee, and four commissioners selected to represent a range of views. The United States was selected as one of the members of the bureau in 2012 to serve through the 2014 meeting of the Commission.

Quorum

While negotiations regarding the future of the IWC were ongoing, the parties made every effort to resolve issues by consensus and avoid voting. At the 2011 annual meeting, however, the countries seeking creation of a South Atlantic Whale Sanctuary called for vote on that proposal. This prompted 21 national delegations to leave the room on the grounds that such a vote would be divisive. With their departure, it was unclear whether the necessary quorum remained to proceed with the vote or to conduct any other business. This halt to the plenary session prompted extensive discussion as to how the IWC's quorum rule should be interpreted and ultimately led to establishment of a working group to review and consider the possible interpretations of the IWC's quorum rules and recommend any necessary clarifying amendments for consideration at the 2012 IWC meeting. The working group identified two key issues to be resolved—first, whether the requirement that a majority of members be present to take action during a session is an ongoing one or whether presence of a quorum is determined at the outset of a session and continues throughout that session even if members decide to leave the meeting, and second, whether parties whose voting rights have been suspended (e.g., because of non-payment of dues) should be counted in making quorum determinations. In the end, the IWC decided to leave its existing quorum provisions unchanged at its 2012 meeting, with the understanding that it may be necessary to revisit them in the future.

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.

As discussed in the Commission's 2010–2011 report, the Secretary sent a letter to the President on 19 July 2011 certifying Iceland for its commercial hunt of fin whales and proposing a number of non-trade responsive actions. 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 suspension of fin whaling then in effect, (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.

The organizations that petitioned the Secretary of Commerce to certify Iceland for its fin whaling also petitioned the Secretary of the Interior seeking certification of 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 (CITES) by allowing exports of fin whale meat. Both Iceland and Japan, to which fin whale meat is exported by Iceland, are CITES parties.

Iceland and Japan have filed reservations to the CITES Appendix I listing of the fin whale and, as a result, are not treated as parties to CITES with respect to trade involving this species. However, under CITES Resolution Conf. 4.25, they are expected to manage any trade involving fin whale meat or other products in accordance with the requirements pertaining to a species included in Appendix II. Trade of Appendix II species may be permitted only 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." Although Iceland believes that its taking of and trade involving fin whales meet the applicable standards and it has made a "non-detriment" finding, the crucial question for the Secretary of the Interior to consider under the Pelly Amendment is whether Iceland's non-detriment findings are consistent with applicable CITES requirements.

As discussed in the Commission's 2010–2011 report, the Fish and Wildlife Service requested assistance from the Marine Mammal Commission in reviewing the information pertaining to Iceland's take and subsequent export of fin whale meat. 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 requirements. In responding to the Service, 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 for making a non-detriment finding for the export of fin whale meat under Appendix II of CITES.

On 7 December 2012 the petitioners sent a follow-up letter to the Secretary of the Interior prompting action. These conservation and animal welfare organizations noted that, although Iceland had refrained from hunting fin whales in 2011 and 2012, it had continued to ship whale meat to Japan. They indicated that during 2011 and 2012, 1,853 tons of whale products had been exported by Iceland.

At the end of 2012 action by the Secretary of the Interior to certify Iceland under the Pelly Amendment for its trade in fin whale products was still pending.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is the primary international framework for ensuring that international trade in animals and plants is not detrimental to the survival of species. The Convention entered into force in 1975. As of the end of 2012, 177 countries had signed and ratified the agreement. A Conference of the Parties is held approximately every third year, the last one being in 2010. The Fish and Wildlife Service is the lead agency for implementing the convention in the United States although it coordinates closely with the National Marine Fisheries Service on species under that agency's jurisdiction. Under CITES, species are classified into three appendices depending on their conservation status, and trade in them is regulated accordingly.

Appendix I consists of species considered to be threatened with extinction and that are or may be affected by trade; commercial trade is prohibited for these species except for a few exceptions (e.g., some captive-bred specimens). Appendix II includes species that are not necessarily threatened with extinction but could become so unless trade in them is

strictly controlled; such controls include the requirement to ensure that trade is not detrimental to the survival of the species and that specimens were legally obtained. Appendix II also may include "look-alike" species (i.e., when the species or its products in trade are so similar in appearance to those of a protected species that the two could be confused). Appendix III includes species that any party identifies as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation and for which that party needs the cooperation of other parties to control trade. Additions and deletions of species listed in Appendices I and II require concurrence by two-thirds of the parties voting on a listing proposal. Any party within the range of a species may place that species in Appendix III unilaterally. Member countries may propose adding or deleting species from the appendices or transferring species from one appendix to another before any Conference of the Parties.

During 2012 CITES was planning its 16th Meeting of the Conference of Parties (CoP16) to be held in March 2013 in Bangkok, Thailand. The Fish and Wildlife Service leads preparation by the United States for these meetings. On 11 April 2012 the Service published a *Federal Register* notice (77 Fed. Reg. 21798) seeking public input on prospective proposals to amend the CITES appendices under consideration by the United States. Three pertained to marine mammals. The Service indicated that it had yet to decide whether to propose moving the polar bear (*Ursus maritimus*) from Appendix II to Appendix I or to propose that the walrus (*Odobenus rosmarus*) (currently in Appendix III) be placed in either Appendix I or II. The Service also indicated that it was unlikely to propose that the narwhal (*Monodon monoceros*) be transferred from Appendix II to Appendix I, as had been suggested by some members of the public. The Commission provided comments to the Fish and Wildlife Service on 20 June 2012, and these are summarized for each species below.

The deadline for submitting proposals to amend the list of species protected under CITES was 4 October 2012. The United States submitted one proposal related to marine mammals, the proposed transfer of the polar bear from Appendix II to Appendix I. In addition, Benin, Senegal, and Sierra Leone jointly submitted a proposal to transfer the West African manatee (*Trichechus senegalensis*) from Appendix II to Appendix I.

Polar Bear

The polar bear is listed in CITES Appendix II and was listed as threatened under the U.S. Endangered Species Act in 2008. At the 2010 Conference of Parties, the United States sought unsuccessfully to transfer the polar bear from Appendix II to Appendix I because of the effects of trade and the ongoing and predicted negative effects of climate disruption. The Marine Mammal Commission had recommended against the Fish and Wildlife Service making such a proposal. In doing so, the Commission noted that it did not believe that polar bear takes and resulting trade warranted additional management at that time. However, in light of the threatened status of polar bears, the uncertainties surrounding the status of many populations, and the rapid pace of habitat change, the Commission advised the Service to reconsider periodically whether making such a proposal would have become warranted.

Noting that the U.S. polar bear proposal had been rejected by the CITES Parties in 2010, the Commission, in commenting in 2012, believed it essential for the Service to expand the rationale for any new proposal, focusing particularly on factors that had changed since 2010. The Commission found that conditions had changed sufficiently in the past few years and recommended that the United States proceed with a proposal to place at least some polar bear populations in Appendix I.

The previous U.S. proposal was premised largely on modeling that predicted significant sea ice declines over the next several decades. The loss of sea ice is expected to limit the access of polar bears to their primary prey (ice seals) and this, in turn, will lead to reduced body condition, reproduction, survival, and population size. Such predictions are still the prevailing view among most polar bear experts and are reflected in the summary polar bear population status report from the 2009 meeting of the IUCN Polar Bear Specialist Group.[1] That summary indicates

1 http://pbsg.npolar.no/en/status/status-table.html.

that of the 19 populations, 8 are declining, 7 are too data deficient to determine a trend, 3 are stable, and 1 is increasing. The Polar Bear Specialist Group also estimated the risk of future declines and found that 6 populations had a very high risk, 1 had a "higher" risk, 1 had a moderate risk, 2 had a very low risk, and 9 were data deficient.

Research not available before the 2010 CITES meeting supports the view that the loss of sea ice will have, and already is having, adverse effects on polar bears. For example, an analysis of data from polar bears in the southern Beaufort Sea (Rode et al. 2010) found that "[t]he size and condition of most sex/age classes exhibited positive relationships with the annual availability of preferred sea ice habitats" and "the decline over time in the availability of sea ice corresponded with declining trends in most measures of bear size and condition." Also, looking specifically at the southern Beaufort Sea population, Regehr et al. (2010) concluded that "[d]eclines in polar bear survival during the period 2002–2005 were associated with longer ice-free periods over the continental shelf" and hypothesized that "declining sea ice affects polar bear vital rates primarily via increased nutritional stress." Similarly, Rode et al. (2012) reported that the decreased availability of sea ice has begun to affect the condition of polar bears in Baffin Bay and Davis Strait.

The Commission also recognized that hunting pressure on some polar bear populations in Canada seems to be increasing and that commercial demand appears to be a contributing factor. For example, in 2011 Nunavut decided to increase the allowable take of polar bears from the western Hudson Bay population from 8 to 21 despite a strong contrary recommendation from the Polar Bear Specialist Group.[2] Natives from Nunavik (northern Québec), Nunavut, and Ontario all hunt polar bears from the southern Hudson Bay population. In 2012 the harvest from that population by hunters from Inukjuac (on the Québec coast of Hudson Bay) spiked from the low single digits to more than 70 bears. In 2012 representatives of Nunavik, Nunavut, and Ontario met with Environment Canada to consider lowering the level of future takes. In the end, they agreed to a tentative quota of 60 bears, a level that most polar bear scientists believe is unsustainable. Furthermore, that quota remains largely unenforceable in Nunavik and possibly in Ontario because of formal treaty obligations and other less formal agreements between governmental authorities and Native hunters. The Commission advised the Service to monitor closely the new take limits to be set by Nunavut later in 2012 and to factor these into its decision on whether to move forward with a proposal to list the species in Appendix I. In particular, the Commission advised the Service to track whether hunting from the western Hudson Bay population is to be allowed. This is one of the populations that appear to be declining based on estimated vital rates and other evidence, but that traditional knowledge suggests is increasing, based on the number of bears sighted on land.

In the Commission's view, an expanding commercial market for skins taken in Canada provided additional justification for the listing of polar bears in Appendix I. Press reports indicate that the international market for polar bear skins is booming, with auction prices more than doubling over the past couple of years. In part, this is being fueled by emerging demand in China and Russia. Auction prices now average about $5,000 per skin, with at least one fetching more than $12,000. The number of pelts being offered for sale also has been increasing. In 2011 about 80 polar bear hides were sold at auction, and the website of Canada's leading auction house for polar bear skins indicated that 150 polar bear hides would be offered for sale at its June 2012 auction. Rising prices and demand for polar bear skins are posing new risks to polar bear populations as unmanaged populations are exposed to greater hunting pressure, quotas for populations subject to taking limits are being pushed upward by political pressure, and established hunting limits are more likely to be met fully. An Appendix I listing would prohibit commercial trade in polar bear skins.

Because of the ongoing and predicted declines in most polar bear populations, the growing scientific documentation that the condition of bears in several populations is deteriorating, concerns about the sustainability of some of the currently authorized take levels, and increasing commerce in and prices for

2 http://pbsg.npolar.no/en/news/archive/2011/WH-catch-Nunavut-2011.html.

polar bear products internationally, the Commission concluded that a much stronger case for uplisting could be made in 2013 than the one attempted in 2010. As such, the Commission recommended that the Fish and Wildlife Service submit a proposal for consideration at the 2013 Conference of Parties that the polar bear be placed in Appendix I.

The Commission further noted that management practices and policies vary considerably among the five polar bear range states. Only Canada and Greenland allow hunters to sell unaltered polar bear parts. In the United States, polar bears may be taken by Alaska Natives for subsistence and for purposes of creating and selling authentic articles of handicrafts and clothing. In Russia, the hunting of polar bears has not been authorized since the mid-1950s, but Russia has acknowledged that some illegal hunting is occurring, although the extent to which the products from bears killed (or live orphaned cubs) are entering into international trade is unknown. Norway, the other range state, does not allow any hunting. Even within Canada, the status of the populations and the management practices of the responsible provincial and territorial governments vary considerably. Take limits for some populations appear to be conservative, while others are less so and do not appear to be sustainable.

This being the case, the Commission advised the Service to consider a proposal that seeks to list in Appendix I only those populations (or ecoregions[3]) that likely are declining or that may not be managed sustainably. A population-specific or ecoregion-specific proposal would provide some incentive for precautionary management to be applied to populations or ecoregions not included in Appendix I because the economic benefits from commercial trade would not be lost. At the same time, the Commission recognized that reviewing and making decisions on all 19 polar bear populations would be a much more complex undertaking, requiring considerable resources and likely prompting intensive and extensive debate on a number of populations. Nevertheless the Commission thought that the Service should weigh the pros and cons of a population-specific or ecoregion-specific proposal for an Appendix I listing of the polar bear.

3 The Service's final rule listing the polar bear as threatened (73 Fed. Reg. 28212) identified four ecoregions (defined according to factors such as seasonal ice, archipelago, divergent ice, and convergent ice) in which polar bears face different risks of extinction based on the predicted patterns of ice formation and disappearance.

Walrus

Canada listed its walrus populations in CITES Appendix III in 1975. The intent of that listing was to monitor levels of international trade in walrus parts. As it did prior to CoP15 (Doha 2010), the Fish and Wildlife Service solicited comments on whether it should submit a proposal for consideration at CoP16 (Bangkok 2013) to move the walrus from Appendix III to Appendix II. In 2009 the Commission had recommended that the United States submit such a proposal; however, the Service opted not to do so. In its 20 June 2012 letter, the Commission again recommended that the Service propose placing walrus in Appendix II.

The Commission noted that the most recent IUCN Red List assessment (in 2008) found the abundance and trends of the Atlantic and Pacific walrus subspecies to be poorly known and therefore classified both subspecies as "data deficient." The number of Atlantic walruses has been estimated at 18,000 to 20,000, but the reliability of that estimate is unknown. The subspecies' long-term trend also is unknown. Some regional populations are thought to be in decline, and others may be increasing (Lowry et al. 2008).

Chapter II provides a history of exploitation of Pacific walruses and of efforts to estimate population size. Minimum estimates derived from aerial surveys conducted at five-year intervals from 1975 to 1990 were in the range of 200,000 to 250,000 animals. However, because estimation methods varied during that period, the estimates cannot be compared and do not provide a basis for judging recent trends in the Pacific walrus population (Allen and Angliss 2010). In 2006 the Service, in collaboration with Russian researchers, conducted the first comprehensive survey of Pacific walruses since 1990. The Service estimated the number of walruses within the surveyed area of Bering Sea pack ice at 129,000 (95 percent confidence interval of 55,000 to 507,000). The estimate is considered to be negatively biased

to an unknown extent because poor weather conditions did not allow counts to be conducted in all walrus habitat (Speckman et al. 2010). Also some 4,000 to 5,000 additional walruses provisionally considered to belong to the Pacific subspecies are found in the Laptev Sea region in Arctic Russia. The Service's final 2009 stock assessment report used these numbers to estimate a potential biological removal level of 2,580 animals for the Pacific walrus population. This is about 53 percent of the estimated annual mean number (4,852, standard error 346) taken (including struck and lost) between 2006 and 2010 in the United States and Russia.

On 10 February 2011 the Fish and Wildlife Service found that listing the Pacific walrus population as endangered or threatened under the Endangered Species Act was warranted but precluded by other higher priority listing actions. The Service identified the loss of sea ice in the summer and fall and its associated impact, as well as subsistence hunting, to be the primary threats to the population in the foreseeable future. In 2007 Alaska Natives and scientists began detecting major changes in walrus feeding, haul-out patterns, and survival, and these observations have persisted in subsequent years. The retreat of pack ice beyond the continental shelf of the Chukchi Sea in late summer in some years has forced walruses to move away from offshore summer feeding areas and to haul out on land along the northwestern coast of Alaska. The Service concluded that continuation of this trend will expose "all individuals, but especially calves, juveniles, and females, to increased levels of stress from depletion of prey, increased energetic costs to obtain prey, trampling injuries and mortalities, and predation."

The Marine Mammal Protection Act allows taking of Pacific walruses by Alaska Natives for subsistence purposes and to make and sell traditional handicrafts and clothing. Currently, there is no limit on the numbers of walruses that can be taken by Alaska Natives for these purposes, provided that the taking is not accomplished in a wasteful manner. Subsistence hunting of walruses also is authorized in Russia and is managed under a quota system. Although the Fish and Wildlife Service considers current levels of subsistence take to be sustainable, they are likely to become unsustainable as the walrus population declines in response to diminishing summer sea ice.

International trade primarily involves walrus parts and items derived from them, including ivory pieces, jewelry, and carvings, as well as bone carvings and tusks. As indicated in the Service's *Federal Register* notice concerning listing under the Endangered Species Act, from 2004 to 2008, 812 kilograms of walrus bones, bone pieces, carvings, teeth, and tusks, and an additional 391 walrus specimens were exported or re-exported from the United States. In its finding that listing is warranted under the Endangered Species Act, the Service concluded that imports to or exports from the United States were not a threat to the Pacific walrus "because most specimens imported into or exported from the United States are fossilized bone and ivory shards, and any other walrus ivory can only be imported into or exported from the United States after it has been legally harvested and substantially altered to qualify as a Native handicraft." Nevertheless, if unregulated hunting of walruses for purposes of making and selling handicrafts continues unabated from a declining population, the impact of trade likely will increase.

Noting that unregulated subsistence hunting is likely to exacerbate predicted declines caused by the reduction of sea ice and that existing regulatory mechanisms are insufficient to reduce or limit greenhouse gas emissions that result in sea ice loss, the Commission concluded that walrus populations are at considerable risk. Furthermore, trade in walrus products may be a contributing factor; as walrus numbers decline, the products (e.g., ivory) may be considered more valuable, leading to increased trade. The Commission asserted that a CITES Appendix II listing for the walrus would help ensure that trade does not become detrimental to the species' survival and recommended that the Fish and Wildlife Service propose to list the walrus in CITES Appendix II at CoP16. Despite that recommendation, the United States did not submit such a proposal for consideration at the conference.

Narwhal

The narwhal is listed on the IUCN Red List as "near threatened," primarily because of potentially exces-

sive removals by hunters in Greenland and parts of Canada, the two countries where hunting of this species occurs. Much of the concern regarding the narwhal's status has focused on the West Greenland and East Greenland stocks, which were previously poorly known and thought to be depleted and small, respectively.

At Canada's request, the species initially was included in Appendix III but was moved to Appendix II at the 1979 Conference of the Parties. In 1984 West Germany proposed moving the narwhal to Appendix I, but that proposal was rejected at the meeting in 1985. In 1995 the CITES Animals Committee reviewed trade of narwhal ivory to identify problems with CITES' implementation for this heavily traded product. At the 2004 CITES conference, the parties decided to review narwhal trade again, but the narwhal subsequently was removed from the list of species to be reviewed based on information submitted by Canada and Greenland at a 2006 meeting of the Animals Committee. The Committee's rationale was that parties to the convention were implementing the elements of CITES Article IV pertaining to non-detriment findings and that further review was not warranted.

In commenting in 2012 on the prospect of a U.S. proposal to move the narwhal to Appendix I, the Marine Mammal Commission noted that current data on narwhal stock structure, removals, movements, behavior, abundance, and population dynamics indicate that hunting of these stocks may not pose as significant a threat as previously feared. Although some intermingling may occur, summer aggregation patterns indicate that several different stocks occur in northwestern Greenland and the Canadian High Arctic, with additional stocks in the waters of both eastern Greenland and northern Hudson Bay. Analyses of aerial survey data from 2006–2008 indicate that narwhal stocks in northwestern Greenland number 8,368 in Inglefield Bredning (5,209–13,442, 95 percent confidence interval) and 6,024 (1,403–25,860) in Melville Bay. The East Greenland stock was estimated at 6,444 (2,505–16,575) (Heide-Jørgensen et al. 2010). These estimates are substantially higher than those derived from previous surveys and have provided a basis for new recommendations on sustainable removal levels for East and West Greenland stocks. Thus, concerns about over-exploitation have, to some extent, been alleviated.

Aerial surveys conducted in Canada during the summers of 2002 to 2004 determined that the summering range of narwhals in the Canadian High Arctic is vast. Those surveys produced an abundance estimate of 60,000 animals or more (Richard et al. 2010). In 2011 Canada released its "Evaluation of Canadian Narwhal Hunt Sustainability with Respect to Making a CITES Non-detriment Finding." This reported that surveys of the Canadian High Arctic had indicated approximately 90,000 narwhals within the large summer range. The report recommended total allowable landed catch levels for each summering aggregation based on calculations of potential biological removal and identified areas where further data were required to determine sustainability of removals or where current take levels are unsustainable (i.e., northern Hudson Bay).

Given current abundance estimates indicating that narwhal populations are larger than previously believed, and the non-detriment findings prepared by narwhal range states, the Marine Mammal Commission noted that the current CITES Appendix II listing provides sufficient protection for the narwhal from potential adverse effects related to international trade in narwhal specimens. As such, the Commission recommended that the Fish and Wildlife Service not propose to list the narwhal in CITES Appendix I at the 2013 Conference of Parties. The Commission cautioned that narwhals live in an environment that is undergoing rapid change due to global warming and that the range states should continue to monitor closely the status of narwhal stocks subject to hunting and to track and report information on international trade in narwhal ivory. The Commission therefore encouraged the Fish and Wildlife Service and the National Marine Fisheries Service to take steps within CITES and other international bodies to ensure that such careful monitoring takes place and that the results are reported in a transparent and timely manner.

Consistent with the Commission's recommendation, the United States did not propose that the narwhal be moved from CITES Appendix II to Appendix I.

West African Manatee

Benin, Sénégal, and Sierra Leone submitted a proposal prior to 4 October 2012 for consideration at CoP16 to have the West African manatee moved from Appendix II to Appendix I.[4] The species is cited on the IUCN Red List as "vulnerable" and there is no reliable population estimate (Marsh et al. 2011, Powell and Kouadio 2008) although the CITES proposal stated the population numbers fewer than 10,000 animals. The proponents of the proposal explained that the available information indicates that the population has been declining continuously over the past decade due to a variety of factors including habitat loss and modification, hunting and trapping (mostly illegal), fragmentation of water courses by dams, pollution, and accidental catch in fishing nets. In addition, there is active trade in meat and byproducts of the species within and among several of the countries within the manatee's range, and this trade seems to be increasing.

Antarctica: Ross Sea Marine Protected Area Proposal

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was established by the consultative parties to the Antarctic Treaty System in 1982. CCAMLR's main objective is the conservation of Antarctic marine living resources, with conservation being defined to include rational use. CCAMLR's administrative jurisdiction is the Southern Ocean surrounding Antarctica, roughly from the continent out to the Antarctic Convergence, which is considered to be the natural northern boundary of the Antarctic marine ecosystem. This consensus-based organization has 25 Commission members and 35 party countries. CCAMLR meets once a year at its headquarters in Hobart, Australia. As a member of CCAMLR, the United States has a long history of scientific leadership, drawing on the expertise of National Marine Fisheries Service's Antarctic Living Marine Resources Program, in areas

Proposed Marine Protected Area in Antarctica's Ross Sea[5]

U.S. Department of State Media Note
Office of the Spokesperson, Washington, DC, September 17, 2012

In order to advance marine protection and scientific research in one of the last great ocean wilderness areas on the planet, the United States submitted a proposal to the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) on September 7 to establish a marine protected area (MPA) in the Ross Sea Region of Antarctica.

The Ross Sea Region encompasses the most productive ecosystems of the Southern Ocean and supports a unique assemblage of species found nowhere else on Earth. It is home to one third of the world's Adélie penguins, one quarter of the world population of Emperor penguins, half of the Southern Pacific population of Weddell seals, and half of the world's Ross Sea killer whales. The Ross Sea Region's unparalleled scientific research possibilities, high biological diversity, and as yet intact ecosystems make it an area of tremendous conservation and scientific value for current and future generations.

The proposed MPA would encompass roughly 1.8 million square kilometers (700,000 square miles), safeguard habitats that support essential ecosystem processes, and protect areas vital to whales, seals, penguins, commercially valuable and other fish stocks, and the species they feed upon.

The result of extensive consultation with stakeholders and other CCAMLR member countries, the proposed MPA is designed to balance ecosystem protection, scientific research, and commercial fishing interests. The MPA would establish a large area of the Ross Sea as a fully protected no-fishing zone to preserve the ecosystem and serve as a scientific reference area for studying the effects of fishing and climate change. In other areas of the MPA, however, some fishing activities would be allowed, and outside the MPA fishing activities would continue as currently permitted.

4 See http://www.cites.org/eng/cop/16/prop/E-CoP16-Prop-13.pdf.

5 http://www.state.gov/r/pa/prs/ps/2012/09/197817.htm

such as the assessment of fish stocks and ecosystem monitoring and management. Since the United States is a significant importer of toothfish (*Dissostichus* species), the Service's Toothfish Import Monitoring Program controls the importation of Antarctic marine resources into the United States and works with other CCAMLR parties to monitor and enforce controls on toothfish harvest and trade.

In 2012 the United States developed and submitted to the CCAMLR members a proposal for a Marine Protected Area (MPA) in the Ross Sea region (see text box). New Zealand also submitted a proposal for an MPA in the Ross Sea, and, at the urging of many member nations, the two countries agreed on a joint proposal. The joint proposal would protect roughly 876,000 square miles (2.27 million square kilometers) of the Ross Sea, an area larger than the state of Alaska, encompassing coastal waters near the Antarctic continent and neighboring islands, the continental shelf, the continental slope, and open water areas of the Southern Ocean (Figure IV-1). CCAMLR did not reach consensus on any of the MPA proposals at its 23 October to 1 November 2012 meeting although members agreed to convene a special meeting in Germany in July 2013 to consider them further. At the end of 2012 the United States was working with New Zealand and other interested governments to make progress on this important marine protection initiative prior to the July 2013 special meeting.

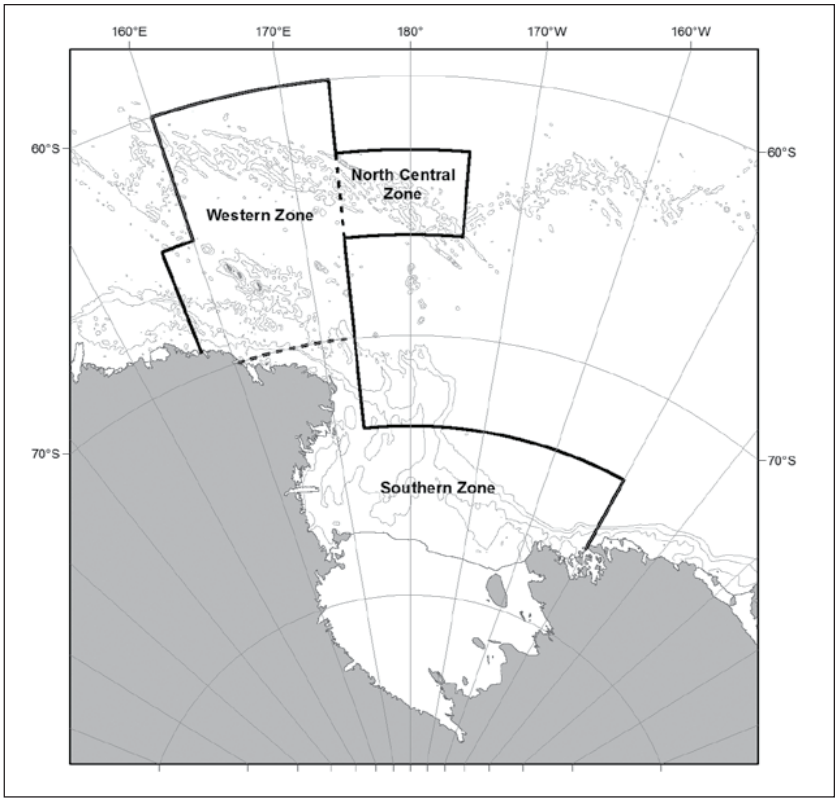

Figure IV-1. Boundaries of original U.S. proposal for Ross Sea Marine Protected Area as described in the September 2012 proposal to CCAMLR. These boundaries were modified in a subsequent joint proposal with New Zealand. No agreement had been reached on this proposal by the end of 2012.

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 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 2012.

Asian Freshwater Cetaceans

Freshwater cetaceans (including five dolphin species and a porpoise)[6] are among the world's most threatened mammals (Reeves et al. 2000, 2003; Jefferson and Smith 2002). Four of the seven currently recog-

6 (*Lipotes vexillifer, Inia geoffrensis, Inia boliviensis, Platanista gangetica, Sotalia fluviatilis, Orcaella brevirostris*, and *Neophocaena asiaeorientalis*) http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=645&Itemid=340

nized cetacean species with freshwater populations occur in Asia, and all of these populations are endangered or critically endangered according to the IUCN Red List. Freshwater cetaceans have declined dramatically in numbers and range, especially in Asia. The threats are diverse, longstanding, and difficult to assess and manage. Bycatch in fishing gear (entanglement or entrapment, usually leading to death) is the most serious and immediate problem for most populations, and gillnets are the greatest currently recognized cause of human-induced mortality. Freshwater cetaceans also are vulnerable to habitat modification and degradation (e.g., noise, chemical pollution, dams, lack of stream volume), and they compete with humans for prey. Vessel strikes, underwater explosions, the impact of electro-fishing, and entrapment in water management structures, notably irrigation canals, also can cause injury or death. Some of these factors kill animals outright, and others impair their health or undermine their reproductive capabilities and social behavior.

Unlike coastal and pelagic marine cetaceans, many freshwater animals live in environments where the very availability of water can be in doubt. All freshwater cetaceans require adequate water flow and water quality within their range as basic elements of suitable habitat to support their physical health, mobility, and ability to forage efficiently and find prey. In freshwater (and estuarine) ecosystems, more so than in coastal or oceanic systems, such basic elements are finite and may be completely regulated, modified, or destroyed by human activities. The constricted nature of riverine habitat, and the inescapable need to share that habitat with humans, increases the vulnerability of these animals to bycatch in fisheries, overfishing of their prey, disturbance by noise, and being struck or displaced by vessels.

Although most of the identified threats to freshwater cetaceans are widespread in Asian river systems, and most freshwater cetacean populations face multiple threats, the types and intensity of human activities differ between different rivers. Nonetheless, in all cases, the human impact on river systems and on freshwater cetaceans is significant. In some cases the operative or limiting threats are obvious (e.g., bycatch, entrapment in canals), while in others it is not clear if one threat is having more impact than another or if population declines are a result of the cumulative effects of several factors.

Irrawaddy dolphins in the Mekong River: All freshwater populations of Irrawaddy dolphins (*Orcaella brevirostris*) are critically endangered. A demographic study of the Mekong River population by World Wide Fund for Nature scientists, based on photographic identification surveys from April 2007 to April 2010, estimated the population at 85 individuals (95 percent confidence interval 78–91), excluding young calves. The study found that recruitment is very close to zero—while births occur, few animals survive to adulthood (Ryan et al. 2011). The annual change in population size is 0.978 (95 percent confidence intervals 0.88 to 1.075), indicating a slow decline. The authors concluded that the population seems to be slowly disappearing with no effective replacement. In its 2010–2011 annual report, the Commission reviewed the threats to this dolphin population and reported that, while entanglement in fishing gear is the primary cause of adult mortality, the cause or causes of death of calves remain a mystery.

Mekong Irrawaddy Dolphin Conservation Workshop: In January 2012 the Mekong Irrawaddy Dolphin Conservation Workshop was held in Kratie, Cambodia, to refine understanding of the status of dolphins in the Mekong River, determine the cause or causes of the exceptionally high calf mortality documented in recent years, and improve protection measures (especially pertaining to bycatch in gillnets). The workshop was jointly hosted by the three agencies and organizations engaged directly in conservation of Mekong dolphins in Cambodia: the Cambodian Commission for Dolphin Conservation and Development of Mekong River Dolphin Ecotourism, the Fisheries Administration of the Ministry of Agriculture, Forestry and Fisheries of Cambodia, and the World Wide Fund for Nature (which sponsored the majority of participants). Additional funding was provided by the Marine Mammal Commission, the United Nations Environment Programme, the Convention on Migratory Species, Oxfam International, the Ocean Park Conservation Foundation, and the Animal Welfare Institute.

At the workshop, an international team of veterinarians, pathologists, and experts in marine mam-

mal behavior and population assessment reviewed the available literature on this dolphin population, current but as yet unpublished population data, the number and nature of strandings, and necropsy results to investigate possible causes of mortality. The pathologists had the opportunity to examine the carcass of an animal that had died in a gillnet, and the behavior experts were able to observe wild dolphins in a "deep pool" area of the Mekong River near Kratie.

The pathologists confirmed that gillnet entanglement is the main cause of death for adult Mekong dolphins, but the cause or causes of death for calves that die around the time of birth could not be determined. There is no evidence to support the idea that a disease process is involved in the high calf mortality. Additionally, levels of contaminants such as PCBs, dioxins, DDTs and heavy metals were low in the animals examined over the last several years and therefore these toxins are not likely to be an immediate or direct cause of the recent high mortality. The pathologists noted that historical contaminant levels could have played a role in the longer-term population decline, but the prominent role of bycatch in fishing gear as a major driver of current adult mortality is unquestioned. Participants also noted reports of direct killing of dolphins, particularly in Tonle Sap Lake, during the years of the Khmer Rouge as well as the likely impact of bombing in the Mekong River basin during the Vietnam War. Their primary finding was that thorough examination of carcasses, especially neonates, by necropsy experts as soon as possible after death is essential to identifying the cause of death. The team of pathologists worked with local responders to review proper techniques and ensure that carcasses are handled and preserved in a manner that best allows such examination.

The experts in marine mammal behavior and population assessment concluded that the current population composition, which appears to be largely of older animals with little evidence of young animals being recruited into the breeding population, would, if confirmed, have serious implications for the long-term viability of the Mekong River population. The experts recommended a suite of field-based research approaches on live animals to better describe age and sex structure and vital rates, to study the behavior of mothers and calves, and to increase the chance of detecting the causes of calf mortality.

At the end of the meeting, the three sponsoring organizations signed the Kratie Declaration on the Conservation of the Mekong River Irrawaddy Dolphins, which recognizes the dolphin population's dire conservation status, the dolphins' importance to tourism, and the need for coordinated, sustained efforts to implement conservation measures. Their pledge of cooperation, their commitment to implement the recommendations of the experts, and the close working relationships fostered at the workshop represent a significant advance for conservation.

One question about the dolphins in the Mekong River relates to the composition of the social groups in each river segment, particularly the dry-season pools where the dolphins congregate when water levels are too low to allow them to move along the larger river course. Workshop participants asked whether a skewed sex ratio in these groups (e.g., a preponderance of males) might lead to some sort of undue behavioral pressure on mothers and their newborn calves. Agonistic behavior toward a calf or aggressive courtship behavior toward its mother could lead to separation or trauma to the calf. The workshop recommended further studies of the social behavior of identified individuals and a biopsy program to determine the sex of animals in the pools. The purpose of such studies would be to explore behavior that might lead to calf deaths, such as infanticide or mobbing, responses to human disturbance, or other factors.

A pilot biopsy effort took place in April 2012 when National Marine Fisheries Service scientists, WWF–Cambodia personnel and Cambodian fisheries officials conducted a combined photo-identification and biopsy effort to test the sampling methodology and observe any negative impact on sampled animals. They hit three individuals with biopsy darts and collected two samples. They found that wounds appeared to heal normally, at least in the first few weeks after biopsies were collected. The investigators concluded, however, that the behavior of the animals and the murkiness of the water made obtaining biopsy samples especially challenging. A second biopsy effort was planned (IWC 2013) and a graduate student from

a U.S. university was slated to initiate behavioral research on the Mekong in early 2013.

Following the January 2012 workshop and the agreement of the concerned government agencies to the Kratie Declaration, significant progress was made on gillnet removal and enforcement, as well as on designating additional protected areas. IUCN provided around $98,000 (in U.S. currency) via a grant from the Save Our Species fund to support patrols by equipping the river guards in Cambodia with gear such as radios, life jackets, generators, and solar panels, and providing them with training on enforcement methods. This project is to run from January 2013 to January 2015.

The Cambodian government also declared a series of large no-gillnet protected areas for Mekong dolphins in September 2012. WWF–Cambodia is working to support the capacity of the Fisheries Administration, Dolphin Commission, and river guards to enforce these areas. A new fishery biodiversity protected area was in the final planning stages at the end of 2012; this soon-to-be designated area will overlap some Mekong dolphin habitat in Kratie Province and is envisioned to support law enforcement locally and further bolster the profile of the area. In the longer term, it is not clear if efforts to protect the natural resource values of this area (fisheries, dolphins, tourism) will prevail against the strong pressure to develop a number of large hydropower projects in the same region.

Irrawaddy dolphins in Laos: The range of Irrawaddy dolphins in the Mekong River has been greatly reduced from what it was historically. The dolphins once occurred throughout the lower Mekong from the delta in Vietnam to the bottom of the Khone Falls in Laos. In Laos their range extended up the Sekong River and its tributaries some 300 km north of its confluence with the Mekong and 200 km north of the Laos/Cambodia border (Ryan 2012, Beasley et al. 2009). Dolphins remain in only five primary areas within a 190-km stretch of river from Kratie to the south to the Khone Falls river stretch just north of the Laos/Cambodia border.

In September 2012 only six animals remained in the pool at the northern end of this diminished range. The population in the deep trans-boundary pool below Khone Falls at the Laos/Cambodia border has declined from at least several dozen thought to have been there within living memory to about 25 in the early 1990s to 8 in 2007, to the 6 that remain in that area in 2012. Ryan (2012), in a technical report from the WWF–Greater Mekong Programme, analyzed the risks to this small population, which include gillnetting and destructive fishing practices such as electro-fishing, disturbance from a large dolphin-watching industry that serves 20,000 people a year, and increasing motorized boat traffic transiting the deep pool. Ryan predicts that this small group in the trans-border pool will be extirpated within 20 years if further measures are not taken to remove the threats. It appears from observations of mating behavior that both males and females are present so there is some chance that, if protected, the population could reproduce and recover. While some regulations are in place to provide gillnet-free zones on the Laos side of the river and there are extensive dolphin conservation areas in Cambodia, the report concludes that existing measures are not sufficient. As most threats to the dolphins in the trans-boundary pool occur in both Laos and Cambodia, actions by both countries and trans-boundary cooperation are required. The report calls for several urgent actions:

- immediate banning of gillnets from all parts of the trans-boundary pool throughout the year
- concerted effort to end illegal fishing and the use of explosives in the area
- trans-boundary efforts to regulate boat traffic transiting the deep pool
- cancellation of a proposed boat ramp and pier at Anlung Cheuteal, and
- secure funding to support conservation efforts at the site, including effective enforcement of the above actions.

Indus River dolphins: Indus River dolphins *(Platanista gangetica minor*), locally called bhulans, face extreme fragmentation of their habitat, uncertainty over the year-round availability of water to fill the river courses they inhabit, and extremely poor water quality in many areas of high urban, industrial, or agricultural development. The most immediate threat to the survival of individual dolphins is entrapment in irrigation gates and canals separated from the main channel of the river. The Indus Basin Irrigation System in Pakistan, according to Braulik et al.

(2006), "consists of 19 barrages, 12 inter-river link canals, and two million kilometers of tertiary watercourses. The system has immense political and economic importance as its waters irrigate more than 180,000 km^2 of arid and semi-arid land; irrigated agriculture accounts for 90 percent of Pakistan's agricultural produce and agricultural goods for approximately 55 percent of Pakistan's exports." Construction of this system, underway since the mid-1800s, has fragmented the Indus River dolphin population. Braulik et al. go on to note, "Historically, the Indus River dolphin occurred in approximately 3400 km of the Indus River and its five tributaries, from the estuary upstream into the foothills of the Himalayas, where distribution was limited by rocky barriers, high velocities, or shallow water. The Indus River dolphin now (in 2001) occupies approximately one fifth of this former range…." A small subpopulation of Indus River dolphins, reported to be as few as half a dozen (Behera et al. 2008) to a dozen or more (*India Times* 2012), persists in the Beas River in Punjab, India, upstream of and completely isolated from the populations in Pakistan.

A 2006 survey of the currently occupied segments of the Indus River in Pakistan (total survey distance of 808 km in the Indus River main channel and 126 km in adjacent secondary channels) resulted in an abundance estimate of 1,442 (95 percent confidence interval 1312–7014) (Braulik et al. 2012). With the addition of an area inaccessible to the survey due to security concerns, the 2006 total abundance was estimated to be between 1,550 and 1,750. The subpopulation in one river segment (Guddu to Sukkur**)** increased by more than 60 percent between 2001 and 2006, an increase the authors attribute at least partly to recovery that began after hunting was banned in 1972 and a dolphin reserve was established in 1974. They also suggest, however, that some of the increase in this downstream river segment could be from "downstream migratory attrition" as dolphins move downstream through irrigation barrages and are unable to return upstream (Braulik et al. 2006, 2012). Nevertheless the smaller upstream subpopulations also appeared to have maintained its numbers between 2001 and 2006.

WWF–Pakistan has instituted programs over the last two decades to encourage community members to alert officials when dolphins are trapped in irrigation canals, and it has trained provincial wildlife managers in methods to free dolphins from nets or entrapment in irrigation canals and return them to the wild. WWF has also demonstrated to fishermen how to avoid catching dolphins in their nets and how to free them, should they be caught. This program encourages fishermen not to leave their nets set and unattended overnight and, because many people are unaware that these are air-breathing mammals, the program emphasizes the simple importance of raising their nets to the surface to allow dolphins to breathe in the course of efforts to free them (Khan et al. 2010).

On 3–4 April 2012 WWF–Pakistan hosted a workshop in Lahore, Pakistan, to develop an Indus River Dolphin Conservation Strategy and Action Plan, 2012–2022. Participants included wildlife department representatives of the three provinces that border the Indus (Sindh, Punjab, and Khyber Pakhtunkhwa); national forest, protected area, environmental protection, and water management officials; non-governmental organizations; and invited experts from the Chinese Academy of Science, St. Andrews University in Scotland, and the Marine Mammal Commission. The workshop took place just less than two years from the time of the major Indus River flood in July–August 2010 that devastated human communities and affected all portions of the Indus River dolphins' range. Preliminary reports from a 2011 abundance survey after the flood indicated 1,300 to 1,400 dolphins seen, fewer than recorded in 2006 (1,550–1,750), but it was premature to determine if this reflected an actual decline. Numbers visible to survey teams might have been reduced due to the high water in the post-flood period in which the survey took place, and formal analyses of the survey data had yet to be completed. WWF–Pakistan reported on 86 successful dolphin rescues and releases since 1982. Concern was expressed over a recent change in fisheries law that encouraged many more people to fish in the Indus River in Sindh Province. Reports indicated that as many as 40 dolphins had been found dead there in the previous year with their deaths attributed to entanglement in fishing nets. The number of new entrants has overwhelmed the ability of local authorities to train fishermen in dolphin-safe fishing practices.

The 10-year plan was not complete by the end of 2012, but based on the workshop discussions it was expected that it would need to address the critical threat of maintaining sufficient water levels and water quality in the range of the Indus River dolphins, both on an annual basis and in the face of long-term changes in water flows as the effects of climate change are felt, especially in the Himalayan headwaters of the Indus. The problem of entrapment in irrigation canals will continue, but community-level approaches to mitigate its impact are available and may be successful if they receive sufficient support. The pressure of fishing on dolphin prey and the threat of entanglement in fishing gear are ongoing and increasing. The workshop noted that conservation of Indus River dolphins requires the attention and cooperation of local communities along the river, the three provinces that border the river, the cities and industries that discharge their effluents into dolphin habitat, and national authorities responsible for water release for irrigation, environmental protection, and maintenance of water-quality standards.

Vaquita

The vaquita is the world's smallest and most endangered cetacean species with a total population of fewer than 200 animals. It is threatened by bycatch in gillnets used to catch blue shrimp (*Litopenaeus stylirostris)* and finfish from small fishing boats in the northern Gulf of California, Mexico. In 1993 the Mexican government created the Upper Gulf of California and Colorado River Delta Biosphere Reserve and banned gillnet fishing in a core area near the mouth of the Colorado River. In 2008, in response to continued evidence of bycatch and accelerating population decline toward extinction, the Mexican government adopted the Action Plan for the Conservation of Vaquita (PACE-Vaquita). Major commitments set out in this plan are (1) monitoring and assessment of vaquita abundance and trends, (2) closure of a designated vaquita refuge to gillnetting and enforcement of that closure, (3) buyouts of gillnet permits from fishermen to reduce fishing effort and encourage fishermen to switch to other livelihoods, and (4) development and provision to fishermen of alternative gear to replace gillnets. The Marine Mammal Commission has reported in detail on implementation of this plan in previous annual reports. Last year the Commission reported on successful development and testing of small artisanal trawl gear to replace shrimp gillnets and noted that the existence of this proven vaquita-safe fishing gear removes the primary obstacle to the Mexican government's imposition of a mandatory phase-out of shrimp gillnets in the northern Gulf of California. This year's annual report focuses on the fourth meeting of the International Committee for the Recovery of the Vaquita (CIRVA IV) and developments regarding gillnet removal, ongoing monitoring and assessment efforts, and political developments in Mexico of significance to vaquita conservation.

The International Committee for the Recovery of the Vaquita: CIRVA, a committee of international experts to advise the Government of Mexico on methods to save the vaquita from extinction, met for the fourth time in Ensenada, Mexico, on 20–23 February 2012 (earlier meetings were held in 1997, 1999, and 2004). The committee reviewed information derived from the 2008 assessment cruise, including the estimated abundance of 245 vaquitas (95 percent confidence interval 68–884), ongoing acoustic monitoring efforts, and information on the reduction, or lack thereof, of threats to vaquitas. The combined evidence indicated that the vaquita population was likely still declining and, in February 2012, probably consisted of fewer than 200 individuals (CIRVA 2012, Gerrodette et al. 2011). It also showed that current protection measures, whether achieved through changes in fishing effort and gear or establishment of no-fishing zones, are insufficient (Gerrodette and Rojas-Bracho 2011).

At its fourth meeting, CIRVA also reviewed the implementation of the PACE-Vaquita action plan and other vaquita conservation efforts since its third meeting in 2004 (described in previous Commission reports). The committee agreed that significant action and funding by the government of Mexico, specifically to (a) designate the vaquita refuge and (b) implement a "rent out" program to reduce fishing in the refuge and decrease unpermitted fishing and "buy-out" and "switch out" programs to reduce the overall number of permits for gillnets fishing in the area, represented a serious commitment by the gov-

ernment of Mexico, without which the vaquita population otherwise might have "reached a state where recovery would not be possible" (CIRVA 2012). The group considered the 2008 abundance survey and the establishment of a passive acoustic program to monitor and detect changes in vaquita abundance to be integral and essential components of this overall effort.

CIRVA IV also received strong evidence of the continued and ubiquitous use of vaquita-entangling gillnets to fish for shrimp and finfish, indicating that the threat of bycatch remains. Gillnets are still widely used within the vaquita refuge where they are prohibited. Outside the refuge where gillnets have not been banned, fishermen frequently use gillnets that exceed the legally allowed length and also set more gillnets than allowed per boat. CIRVA IV concluded that, despite the efforts to reduce gillnet use in the northern Gulf, gillnet fishing effort has actually increased since the late 1990s. CIRVA IV recommended immediate and sustained enforcement of the legal limits on the number and length of nets per vessel and net limits for all finfish fisheries and reiterated its recommendation that all gillnets and other entangling nets be eliminated within the vaquita's range (CIRVA 2012).

In discussing the apparent inadequacy of enforcement of measures to protect vaquitas from gillnet bycatch, CIRVA IV recommended that enforcement of no-take zones and of authorized fishing gear could be strengthened through better inspection efforts and greater transparency in publicizing the results of enforcement operations. Three local fishing communities are involved in a three-year process to develop and gain approval of an environmental impact assessment for small-scale fishing in the Upper Gulf of California and Colorado River Biosphere Reserve. The process is focused on the development of the basic elements of a functional fishery management system in the northern Gulf and may serve to build understanding of fisheries controls and incentives for fishermen to abide by them, as well as more effective enforcement. Implemented measures include keeping lists of vessels and fishing permits for each community, a vessel logbook program to document catches and catch locations, and onboard vessel observers to verify fishing activities.

The Mexican National Fisheries Institute (INAPESCA) has developed and tested, in cooperation with the U.S. National Marine Fisheries Service and with support of the Marine Mammal Commission, artisanal trawls and other gear to replace gillnets. The small Red Selectiva trawl developed by the Institute is reportedly effective in catching shrimp in quantities that exceed the per-trip performance of gillnets currently in use by the fishery (MMC 2012). CIRVA IV concluded that "a vaquita-safe alternative to gillnets is available for catching shrimp with artisanal fishing vessels" and recommended that the conversion to the use of these small trawl nets for catching shrimp proceed as rapidly as possible and that their use in the vaquita's range become mandatory by no later than 15 September 2015. INAPESCA reported that viable alternatives to gillnets for other species such as finfish and sharks have not been developed, and CIRVA IV recommended that this work continue so that conversion of the entire fishing fleet to vaquita-safe gear can be accomplished without further delay, and regardless of the state of finfish gear development, that "gillnets should be banned from the vaquita's range by 1 September 2016" (CIRVA 2012).

At CIRVA IV, Mexican officials described proposed regulations to phase out gillnets and approve the use of alternative trawl gear. After engaging in a public process, Mexico's National Fisheries and Agriculture Commission had tentatively approved a proposal to initiate a three-year process to ban shrimp gillnets and replace them with the new shrimp trawling gear. An amendment to Mexican Official Standard 002-Pesca (regulating shrimp fishing) that would implement such a process, however, had yet to be published in the *Mexican Gazette*. CIRVA IV expressed support for publication of the amendment to the standard, emphasizing the need to include in the regulatory language reference to the prototype shrimp trawl net and mandate a three-year transition from gillnets to the trawl nets.

In addition to being provided to the Mexican government, the recommendations of CIRVA IV were presented in June 2012 to the International Whaling Commission's Scientific Committee, which strongly endorsed them, reiterated its extreme concern over the status of the species, and reaffirmed that the "only

reliable approach for saving the species is to eliminate vaquita bycatch by removing the entangling gear from areas where the animals occur" (IWC 2013). One of the ongoing projects to assess alternative fishing gear was supported by the Scientific Committee's Voluntary Fund for Small Cetacean Conservation Research.

The amendment to Mexican Official Standard 002-Pesca had not been published by the end of 2012. During the final months of the administration of President Calderón in late 2012, the IUCN, various non-governmental organizations, the Society for Marine Mammalogy, and the Society for Conservation Biology sent letters to the President exhorting his government to finalize the standard. The same groups requested the same action within the early days of the administration of President Peña Nieto, which began on 1 December 2012.

Monitoring and assessment: Previous Marine Mammal Commission reports have described in detail the monitoring and assessment efforts that have taken place in parallel with PACE-Vaquita since 2008. These include the 2008 assessment cruise that produced the estimate of 245 animals and the design and implementation of a passive acoustic monitoring array meant to detect, with sufficient statistical precision, a decline of 5 percent per year in the vaquita population in five years or an increase of 4 percent per year within five years (Jaramillo et al. 2012, Rojas-Bracho et al. 2009). Deployment of the acoustic monitoring array has been plagued by equipment losses, primarily as a result of illegal fishing operations in the vaquita refuge. In 2011 it was decided to deploy the main portion of the array (48 moorings) during the summer months when fishing effort is lowest and the risk of loss would be least. This change in timing and further modification of the mooring and retrieval methods in 2012 reduced but did not eliminate equipment loss (12 percent in 2012 vs. 21 percent in 2011) for the 48 hydrophones in the main array deployed from 17 June to mid-September, but losses continued to be high for the hydrophones intended to be deployed year-round on the 16 buoys marking the boundaries of the refuge (88 percent in 2011 and 67 percent in 2012) (A. Jaramillo-Legorreta, Instituto Nacional de Ecología – SEMARNAT. CICESE, pers. comm.). The acoustic data collected in 2012 comprise the second year of what is planned to be a six-year data set to monitor trends in the vaquita population. Preliminary analyses of the 2011 and 2012 data were planned for early 2013 to work through and refine the analytical methods that will ultimately be applied to the full six-year data set.

Western North Pacific Gray Whales

The western North Pacific population of gray whales is listed as endangered under the U.S. Endangered Species Act and as critically endangered by IUCN. In 2012, the median population estimate (excluding calves) from photo-identification data was 141 animals (90 percent Bayesian confidence interval [CI] 142–165), including 33 (CI 29–38) reproductive females (Reeves et al. 2012). In 2010 and 2011 satellite telemetry, photo-identification, and genetic studies provided new insights on the movements and phenology of gray whales and raised new questions concerning their population structure in the North Pacific. Further information was collected in 2012. The Commission's 2010–2011 report included a table of 12 matches of individual gray whales encountered in both the eastern and western Pacific made by the end of 2011. The initial search for these matches by reference to photo-identification catalogues and genetic databases was prompted by the tracking of one individual that had been tagged in October 2010 off Sakhalin Island, Russia, and arrived off the coast of Oregon in February 2011.

Additional photo-id matches and satellite-monitored tracks between the eastern and western Pacific: The results of a comprehensive comparison of the 217 photo-identified gray whales at Sakhalin Island with the 6,546 individuals in the photo-identification catalogue for Baja California, Mexico, were reported to the IWC Scientific Committee meeting in June 2012. Fourteen matches were identified between these two areas: 6 males, 6 females, and 2 of unknown sex (IWC 2012). Thirteen of the whales were sighted in Russia, both before and after they were sighted in Baja California, and five of the females were observed with calves in Russia in summer. Two of these mother-calf pairs were sighted together in Russia; the other three mothers were

inferred to have separated from their calves (i.e., likely due to weaning) or lost their calves before being sighted alone at Sakhalin.

As reported in the 2010–2011 Marine Mammal Commission report, a tagging team coordinated by Bruce Mate (Oregon State University, Marine Mammal Institute) and Valentin Ilyashenko (A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences) received IWC approval to tag up to 12 animals "broadly representative of the non-calf, non-juvenile population of gray whales off Sakhalin" (IWC 2010).[7] Six tags were deployed in summer 2011 and by the end of December two continued to function. These tags were on young 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. At the end of December 2011 they were still on separate tracks, but both were southeast of the Aleutian Islands in the Gulf of Alaska. While one signal was soon lost, the transmitter on one of these whales, an 8.5-year-old female nicknamed Varvara, continued to transmit until the autumn of 2012.[8] After 1 January 2012 the whale continued to travel south from British Columbia, Canada, along the West Coast of the United States and Mexico almost to the southern tip of Baja California. At that point, it reversed course and returned north past the major calving lagoons, along the West Coast and back across the Bering Sea. These migratory movements and this whale's presence in or near the wintering lagoons coincided with the migratory timing of eastern north Pacific gray whales. By early summer, Varvara had returned to the original tagging area at Sakhalin where her movements were recorded until the tag ceased to function on or about 14 October 2012 (IWC 2012).[9]

Satellite tagging, photo-identification, and genetic results have demonstrated that some proportion of the whales feeding at Sakhalin Island migrate to the eastern Pacific. Genetic studies, however, still indicate significant differences between eastern and western populations and strong female-mediated fidelity to feeding areas (IWC 2012). Historical evidence indicates that the coastal waters of eastern Russia, the Korean Peninsula and Japan were part of the migratory route in the western North Pacific and that areas in the South China Sea may have been used as wintering grounds (Weller et al. 2002, Weller and Brownell 2012). Contemporary records of gray whales off Asia are rare, however, with only 13 from Japanese waters between 1990 and 2007 (Nambu et al. 2010) and 24 from Chinese waters since 1933 (Wang 1984, Zhu 2002). The last known record of a gray whale off Korea was in 1977 (Park 1995). While recent observations of gray whales off the coast of Asia are infrequent, they nevertheless continue to occur, including (1) in March 2012 a gray whale was sighted and photographed in Mikawa Bay (Aichi Prefecture) on the Pacific coast of Honshu, Japan (Kato et al. 2012) and (2) in November 2011 a 13-m female gray whale was taken in fishing gear offshore of Baiqingxiang, China, in the Taiwan Strait (Zhu 2012). These observations suggest that not all gray whales in the western North Pacific share a common wintering ground (Weller and Brownell 2012) and it appears that whales feeding off Sakhalin Island during the summer migrate in different directions, with some whales moving east into the eastern North Pacific while others move south, staying in the western North Pacific (IWC 2012).

Oil and gas activities: In 2012 IUCN's Western Gray Whale Advisory Panel (WGWAP) continued its work of reviewing and commenting on gray whale research and monitoring programs off Sakhalin and advising the oil and gas industry and government regulators on protection and mitigation measures. The panel collaborated with Sakhalin Energy Investment Company (SEIC, or Sakhalin Energy) to develop a monitoring and mitigation program for a two-dimensional seismic survey conducted in 2012 to assess shallow-gas hazards at the site of a proposed third offshore platform near Piltun Lagoon, close to a prime gray whale feeding area.

7 This research was conducted by 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 (IWC) and International Union for the Conservation of Nature (IUCN) with funding from Exxon Neftegas Ltd. and Sakhalin Energy Investment Company Ltd.

8 http://mmi.oregonstate.edu/Sakhalin2011

9 http://mmi.oregonstate.edu/Sakhalin2011

Despite the history of cooperation by Sakhalin Energy in heeding independent scientific advice on seismic survey planning, other companies operating off Sakhalin proceeded with seismic surveys in the general vicinity of the Sakhalin gray whale feeding grounds during the open-water seasons of 2010 and 2011 with no such oversight or transparency. The WGWAP continued in 2012 to place emphasis on the need for thorough assessment of the cumulative and aggregate impact of industrial development in the Sakhalin region on gray whales.

Southern Right Whales

Since 2003 southern right whales *(Eubalaena australis)*, especially calves, have been dying in unusually large numbers on the calving/nursing grounds at Península Valdés, Argentina. In 2003 the Southern Right Whale Health Monitoring Program (SRWHMP) was formed to monitor and investigate strandings at Península Valdés. From the 2003 calving season through the end of 2011, 482 dead whales were recorded under this program, 430 (89 percent) of them calves-of-the-year. The Commission's 2010–2011 report described the results of a 2010 International Whaling Commission workshop on the southern right whale die-off (IWC 2011). This workshop considered information from carcasses collected by the SRWHMP, reviewed the biology and population status of the western South Atlantic right whale population, explored ideas for possible causes of mortality, and developed several primary hypotheses to explain the high calf mortality—nutritional stress, biotoxins, infectious disease, or a combination of these factors (IWC 2011). In addition the workshop noted the increasing frequency of attacks by kelp gulls (*Larus dominicanus*), which feed on southern right whale flesh, and called for studies of the role of gulls in causing disturbance to right whale calves (with energetic or behavioral consequences) and as possible vectors of potentially fatal disease. The workshop stressed the need for kelp gull management and policy. The report stated, "Regardless of whether gull lesions are a contributing factor in whale mortality, they cannot be considered as anything other than harmful to the whales." It further noted that precautionary measures to cover, close or consolidate dumps, better manage fish offal (on land and at sea) as well as direct gull control would be expected to lead to improved whale health.

The 2012 calving season brought the highest number of strandings (116 whales) to date, including 113 calves of the year (97 percent) (Table IV-3). This brought the total number of documented dead whales since 2003 to 598, of which 543 (91 percent) were calves (M. Uhart, Wildlife Conservation Society, pers. comm.). The SRWHMP continued to monitor and investigate right whale strandings and, by the end of 2012, had necropsy data on 262 animals examined over the 10 years of the ongoing die-off. With three years of additional data to apply in considering the 2010 workshop hypotheses, SRWHMP veterinarians concluded that a review of results was needed and such a review was anticipated to take place at the May 2013 annual meeting of the International Association of Aquatic Animal Medicine.

IWC Intersessional Workshop on the Assessment of Southern Right Whales: The IWC held a workshop to review the status of southern right whales throughout their range from 13–16 September 2011.

Table IV-3. Southern right whale deaths at Península Valdés, Argentina 2003–2012. (M. Uhart, Wildlife Conservation Society, pers. comm., IWC 2011)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total	Percent
Calves	29	13	36	16	77	89	72	40	58	113	543	91
Juveniles	1	0	4	1	1	0	1	6	3	2	19	3
Adults	1	0	7	1	5	4	5	7	0	1	31	5
Unknown	0	0	0	0	0	3	2	0	0	0	5	1
Total	31	13	47	18	83	96	80	53	61	116	598	

A draft report of the workshop was presented to the 64th meeting of the IWC Scientific Committee in June 2012, and the report was finalized near the end of 2012 (IWC 2013). Estimates of demographic parameters and 2009 abundance levels were generated for different "calving ground units" around the Southern Hemisphere, leading to a total 2009 range-wide population estimate of 13,611 as compared to a similar analysis in 1997 that yielded an estimate of 7,571. Historical catch data were used to model the initial population size of the global southern right whale population in 1770 (i.e., before commercial whaling began on this species) and to simulate the population trajectory from then until the present (Figures IV-2 and IV-3). High catches during the early and mid-1800s depleted the total population to a low point of perhaps only about 400 animals in 1920. Right whales had no legal protection from whaling until 1935. Over the subsequent 25 to 30 years, numbers increased but illegal Soviet whaling in the 1960s dealt another serious blow to the population; 1,312 right whales were taken east of Argentina between November 1961 and February 1962 and about 200 were taken in the southern Indian Ocean in the 1960s, mainly in December (Tormosov et al. 1998). Southern right whales are now thought to be at about 20 percent of their pre-exploitation abundance.

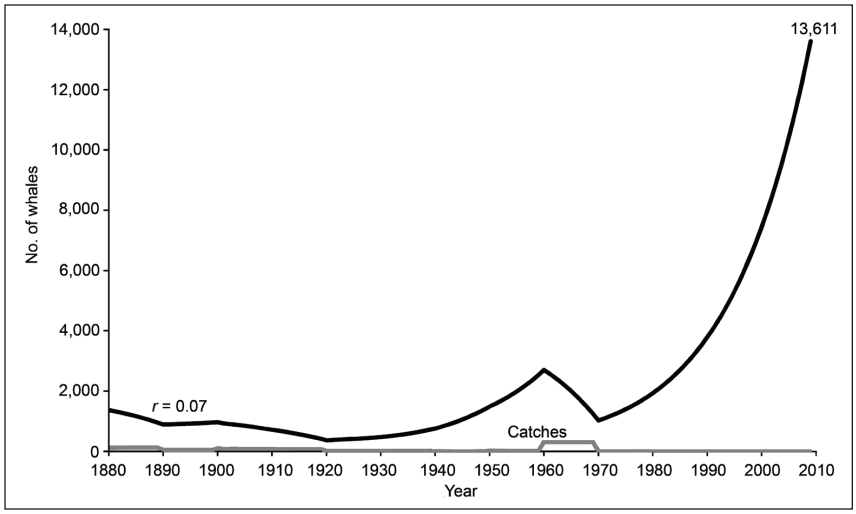

Figure IV-2. Total southern right whale population size and catches for 1770–2009 (all Southern Hemisphere combined). (IWC 2013)

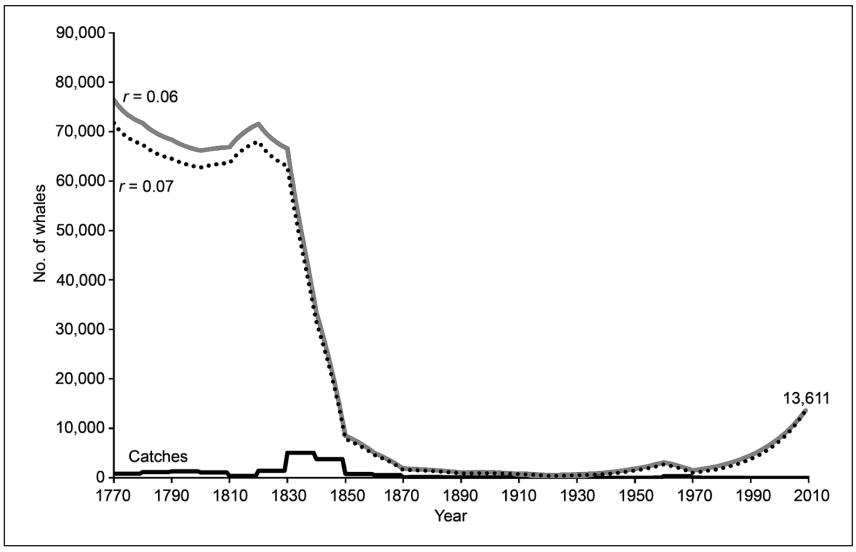

Figure IV-3. Total population size and catches for 1880–2009 (all Southern Hemisphere combined). (IWC 2013).

The rate and extent of recovery from commercial whaling of regional right whale populations associated with different calving/nursing areas around the Southern Hemisphere have been variable (IWC 2013). Four populations have begun to rebound in recent decades, but several others are very small, with sightings rare, and show no evidence of recovery. The largest are the Southern African (4,411), South-central and Southwest Australian (2,420), Southwest Atlantic (4,029), and Sub-Antarctic New Zealand (2,672) populations. The first three of these are growing at rates of between 0.06 and 0.07 per year. Little is known about the small remnant populations in the South-central Atlantic (Tristan da Cunha), the Southeast Atlantic off Namibia, the Southwest Indian Ocean off Mozambique and Madagascar (sporadic sightings of a few individuals over

recent decades), and the Southeast Pacific off Chile and Peru (likely fewer than 10 breeding females). It appears from sightings and genetic studies that a few mothers and calves from Sub-Antarctic New Zealand are slowly re-colonizing the mainland New Zealand calving grounds where right whales were extirpated, and there is a small population off southeast Australia that may be genetically discrete.

Participants at the workshop discussed the southern right whale die-off at Península Valdés, Argentina, and how it might affect recovery of the Southeast Atlantic population. The report of the workshop lists management action to address disturbance by gulls and investigation into infectious diseases and potential disease transmission by gulls as high priorities for this region. Another possible source of disturbance to southern right whales is whale watching in calving or nursery areas. Southern right whales die at least occasionally from entanglement in nets and floating and vertical lines associated with fishing gear and from ship strikes. They are also potentially affected by habitat degradation from noise and chemical or biological pollution and by habitat loss, for example when port development or aquaculture facilities exclude them from preferred areas.

Mediterranean Monk Seal (*Monachus monachus*)

Although once distributed throughout the Mediterranean and Black Seas and along the northwestern coast of Africa, Mediterranean monk seals have been reduced to small fragments of their former range (Figure IV-4). They are now found principally in the Ionian Sea off western Greece and in the Aegean Sea between Greece and Turkey, along the Mediterranean coast of southern Turkey, and in the Atlantic Ocean along a short stretch of coast near the border of Mauritania and Western Sahara, some 1,000 miles (1,600 km) southwest of the Strait of Gibraltar. About 30 to 35 animals are found in the Madeira Archipelago southwest of Portugal (Hale et al. 2011). A few individuals also occur off the Adriatic coast of Croatia (Gomerčić et al. 2011) and possibly on and near the Italian islands of Sicily and Sardinia (Mo 2011) and in the western Mediterranean near the Morocco-Algeria border (Mo et al. 2011). Monk seals once inhabited a portion of the Libyan coast in the southeastern Mediterranean Sea. Although the last reliable report of the species in that rarely monitored area was in the 1970s (Norris 1972), hope continued that

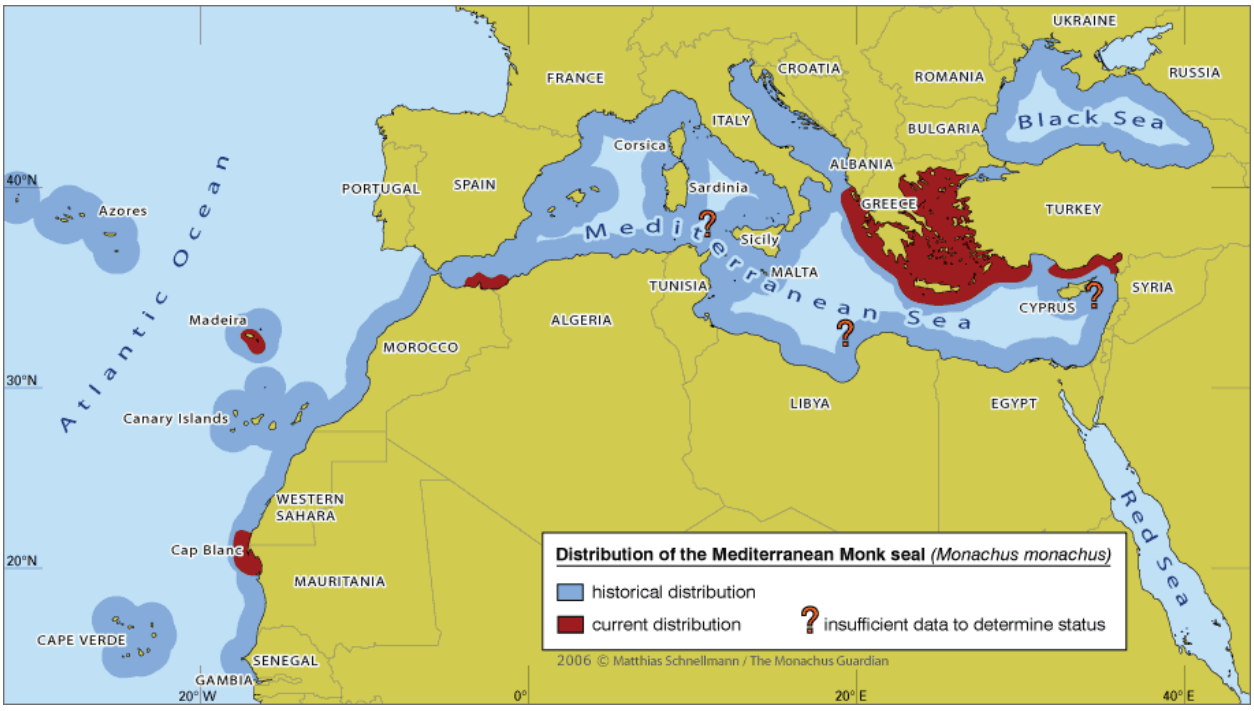

Figure IV-4. Current and former range of the Mediterranean monk seal. (Source: Johnson et al. 2006)

a few animals might still occur there. In March 2012 those hopes were partially rewarded when a juvenile monk seal was found dead off the coast of Libya, 300 miles east of Benghazi, apparently having drowned in a gillnet (Alfaghi et al. 2013).

Because of their fragmented distribution and tendency to haul out in caves—a cryptic lifestyle likely adopted as a result of centuries of human persecution—these seals are difficult to study and surprisingly poorly known, considering that they live in one of the world's most intensively used seas in a region of dense human population. Rough estimates of total abundance range up to 600 (Johnson 2006), making this one the world's most endangered species of marine mammals. The Mediterranean monk seal is listed as endangered under the U.S. Endangered Species Act and critically endangered by the International Union for Conservation of Nature.

The principal threats to survival of Mediterranean monk seals are habitat destruction by coastal development, incidental drowning in gillnets, deliberate harassment and killing by fishermen who consider them competitors for fish and a source of damage to their fishing gear, and random events, such as disease outbreaks. The largest remaining populations are in the Ionian and Aegean Seas. Deliberate killing has been the most frequent cause of death of observed carcasses in Greece (Androukaki et al. 1999) where the best data are available. Such killing has become a growing concern in recent years in the Mediterranean, as it has for Hawaiian monk seals in the Main Hawaiian Islands. From 2011 through 2012, nearly 20 percent of all well-documented monk seal deaths in Greece (6 of 26 deaths in 2011 and 3 of 20 in 2012) were attributed to deliberate human causes, such as gunshots likely inflicted by fishermen who consider monk seals as competitors for their catch (A. Karamanlidis, MOm/Hellenic Society for the Study and Protection of the Monk Seal, pers. comm.). Over the same period, there were 43 recorded births (28 in 2011 and 25 in 2012). However, because systematic monitoring of the entire 16,000 km (10,000 mi) of Greek shoreline is impossible given the limited resources for monk seal research, these numbers represent underestimates of both deaths and births by unknown amounts.

Although a small number of dedicated scientists and environmental groups have championed efforts to promote Mediterranean monk seal recovery since the late 1970s, progress has been very slow and limited. A major impediment has been the unwillingness or inability of national governments in countries where the few remaining seals live to carry out effective conservation programs or provide more than minimal levels of funding for monk seal research or conservation. As a result, most monk seal conservation work has depended on the efforts of (and funding from) non-governmental organizations such as the Hellenic Society for the Study and Protection of the Monk Seal (known as MOm, derived from the species name *Monachus monachus*), a group dedicated to promoting monk seal research and conservation in Greece.

Conservation Actions

The most intensive conservation efforts have been in the Aegean Sea. One of the first and most significant actions in that area was establishment of the National Marine Park of Alonissos, Northern Sporades, by the government of Greece in 1992. Covering 2,200 km^2 (850 mi^2) of nearshore waters around the northern 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 substantial portion of the park's waters and MOm has worked with local residents and park visitors to promote human attitudes and behavior that would allow seals and people to coexist. Although enforcement of conservation measures has been weak, the government of Greece also established a national park on the northern coast of Karpathos and is considering similar designations on the islands of Kimolos and Gyaros. The government of Turkey also has closed an area around the village of Foça on the eastern Aegean coast to commercial fishing to protect monk seals.

To provide a framework for monk seal conservation efforts in Greece, in 2009 MOm updated an earlier monk seal action plan by preparing a new five-year National Strategy Action Plan for the Con-

servation of the Mediterranean Monk Seal in Greece (Notarbartolo di Sciara et al. 2009). That new plan adjusted priorities to emphasize protection of seals in the wild. Under the new plan, previous proposals for some actions, such as captive breeding and translocations to start new colonies, were tabled in lieu of greater emphasis on nurturing involvement and support for habitat protection at national and local levels, developing a national network of protected areas, and implementing a broader suite of conservation measures to protect seals moving outside of and between core habitats in protected areas.

In part, the new plan calls for national legislation to strengthen legal authority for seal protection and to establish a national monk seal conservation commission. Other elements highlight a vigorous public awareness program targeting commercial fishermen and tourists, a national inventory of important habitat sites, stronger management ties between local communities and user groups in designated protected areas, establishment of legally enforceable conservation measures that are applicable throughout national waters, and expanded scientific research.

In 2010 the Marine Mammal Commission provided support for a cooperative research effort between scientists working on the conservation of Mediterranean monk seals and those working on the conservation of Hawaiian monk seals. As part of the grant, a Greek scientist from MOm visited Hawaii to meet with National Marine Fisheries Service scientists and managers, as well as individuals from other government and non-governmental entities in the United States working on Hawaiian monk seal conservation, to compare strategies and results of different research and management activities. The visit helped forge professional ties for future collaborations between Greek and U.S. monk seal conservation 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 round table included project leaders of the Greek monk seal program and the Hawaiian monk seal research program of the National Marine Fisheries Service. The meeting endorsed efforts to devote particular attention to the identification and protection of core monk seal habitat and to develop community-based management initiatives that enhance local involvement and support among people living near core seal habitat and among stakeholder groups, particularly those engaged in fisheries.

Research Activities

As indicated above, Mediterranean monk seals are not well studied and therefore relatively little is known about their biology, ecology, and behavior. Many research techniques developed and used to study Hawaiian monk seals have yet to be applied to Mediterranean monk seals due to limited funding and a lack of experience with such techniques on the part of scientists working in the Mediterranean. To help address that situation, the above-noted Commission grant in 2010 enabled a cooperative study by U.S. and Greek scientists to develop protocols for a genetic research program. The project, undertaken through MOm, addresses a research need identified in the 2009 National Strategy and Action Plan (Notarbartolo di Sciara et al. 2009): improved assessment of the genetic diversity of Mediterranean monk seals and determination of the stock structure within their range. Knowing the extent to which seals move between different areas of the Aegean is important for guiding future management actions in different areas.

In 2010 and 2011 steps were taken by scientists working on the genetic research program to (1) define protocols for collecting and storing genetic samples, (2) assemble samples of seal tissue collected over the past 20 years for analysis, and (3) conduct initial analyses to identify polymorphic microsatellite loci (i.e., unique segments of the species' genetic code or DNA useful for identifying breeding relationships between individual seals and groups of seals). Preliminary results of analyses of tissue samples from 87 seals indicate that individuals and their sex can be determined from tissue samples using genetic markers identified in the study, thereby laying the groundwork for evaluation of population structure, genetic diversity, and breeding relationships between groups of seals, and for the re-identification of individual seals from tissue samples to follow aspects of their movements, habitat use, behavior, etc. The

Table IV-4: Red List status of baleen whale species, subspecies, and subpopulations. Species listed as endangered under the U.S. Endangered Species Act are indicated by (E).

IUCN RED LIST STATUS					
Taxa or conservation units	Critically Endangered	Endangered	Vulnerable	Least Concern	Data Deficient
Species		North Pacific right whale (E) North Atlantic right whale (E) Blue whale (E) Fin whale (E) Sei whale (E)		Bowhead whale (E) Southern right whale (E) Common minke whale Humpback whale (E) Gray whale	Pygmy right whale Antarctic minke whale Bryde's whale Omura's whale
Subspecies	Antarctic blue whale				Pygmy blue whale
Subpopulations	Bowhead whale (Svalbard-Barents Sea) North Pacific right whale (eastern) Southern right whale (Southeast Pacific) Gray whale (western North Pacific) (E)	-Bowhead whale (Okhotsk Sea) Humpback whale (Arabian Sea) Humpback whale (Oceania)	Fin whale (Mediterranean Sea)		

results also suggest that seals in the Aegean and Ionian Seas are reproductively isolated from one another and have low genetic diversity, with a total of only four mitochondrial DNA haplotypes[10]. Genetic analysis of a tissue sample from the dead seal found in Libya in March 2012 revealed it had a haplotype common to seals found in the Aegean, indicating that it may have been a migrant from that area (Alfaghi et al. 2013). The same is true for the samples analyzed from Croatia along the Adriatic coast northwest of Greece.

Global Assessment of Marine Mammals

In 2012 the Marine Mammal Commission continued its work on a global assessment of marine mammals. The goal of the assessment is to identify marine mammal species and stocks most in need of conservation attention, to characterize the salient threats to these species and stocks, and to provide the international community of scientists, managers, and interested organizations a basis for prioritizing their conservation investments and activities. The Commission also is seeking a means of identifying need for and supporting the development of local or regional research/conservation capacity in foreign countries and international areas where marine mammals are at high risk of extirpation or extinction.

The Commission's 2010–2011 report presented information on two global marine mammal assessments, one for pinnipeds (Kovacs et al. 2011) and one for sirenians (Marsh et al. 2011). In 2012 the Commission compiled assessment information for baleen whales that will be published in a forthcoming report. This work is informed by and complementary to the work of the IUCN Cetacean Specialist Group, which completed an assessment of the status of all cetacean species, as well as that of some subspecies and subpopulations, in 2008. The results of the Red List assessments are available on the Red List website.[11] Table IV-4 summarizes the current Red List status of all baleen whale species, subspecies, and subpopulations that have been assessed by IUCN. The Commission's assessment efforts are also informed by the Society for Marine Mammalogy's official list, which includes all living and recently extinct marine mammal species and subspecies.[12] The Society's Ad-hoc Committee on Taxonomy maintains this list and updates it as new descriptions of species or subspecies or other taxonomic actions appear in the technical literature.

10 A mitochondrial DNA haplotype is a distinct DNA segment found in mitochondria of a cell that is passed on from generation to generation only by the mother.

11 http://www.iucnredlist.org/

12 http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=592&Itemid=280

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Chapter V

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, but our understanding of those risks and our ability to mitigate them effectively to prevent harm to marine mammals has not kept pace with advances in energy development. Energy security is a critical goal for the United States, but in achieving that goal we must ensure that adequate safeguards are in place to protect an increasingly stressed and rapidly changing marine environment. The following chapter reviews the status of both traditional and renewable energy development activities in U.S. waters, risks associated with various stages of energy development, actions being taken to mitigate those risks, ongoing research activities, and recommendations for enhancing our ability to better understand and mitigate risks to marine mammals. It also provides an update on efforts to assess injuries and develop restoration options for marine mammals injured by the 2010 Gulf of Mexico *Deepwater Horizon* oil spill.

Offshore Oil and Gas Development

The Commission's 2010–2011 annual report provided a synopsis of offshore oil and gas development in the United States from 1896 to 2006. This section outlines the regulatory framework for offshore oil and gas development and provides a summary of the current five-year leasing program. It reviews the risks to marine mammals from oil and gas development; outlines mitigation, monitoring, and reporting requirements; and highlights regional differences in implementation of the requirements to address and authorize marine mammal takes under the Marine Mammal Protection Act. This section also describes major offshore oil and gas activities that occurred in 2012 and the Commission's comments and recommendations on them.

Editor's Note: *In general, the Commission's style is to limit the use of acronyms in its letters and reports. This has proved to be impractical in presenting the detailed information on multiple energy issues. The result is a wider use of familiar acronyms in this chapter than you will find elsewhere in this report.*

Regulatory Framework for Oil and Gas Development

In 1953 Congress passed the Submerged Lands Act (SLA) and the Outer Continental Shelf[1] Lands Act (OCSLA) to clarify state–federal jurisdiction over offshore oil and gas resources. The SLA reaffirmed the states' authority to grant leasing rights within the boundaries of state waters, generally out to three nautical miles from the coast.[2] OCSLA gave the Department of the Interior (DOI) jurisdiction over all offshore lands beyond state waters and provided the statutory framework for oil and gas development on the outer continental shelf. OCSLA's goals, as

1 Outer continental shelf refers to all submerged lands, subsoil, and seabed lying between the seaward boundary of state waters and the outer limit of the U.S. 200 nautical mile Exclusive Economic Zone (EEZ). For more details, see MMS 1999.

2 The state water boundaries for Texas and the west coast of Florida are nine nautical miles offshore, based on historical claims.

defined by the former Minerals Management Service (MMS) (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;

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;
- 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.

In accordance with the 2011 re-structuring of the MMS[3], responsibilities for the regulation and enforcement of offshore oil and gas development are delegated within the DOI as follows:

Bureau of Ocean Energy Management (BOEM): 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 (BSEE): responsible for ensuring comprehensive oversight, safety, and environmental protection related to offshore energy activities; and

Office of Natural Resources Revenue (ONRR): 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.

OCSLA outlines a four-stage process for oil and gas development (Figure V-1). The first stage involves the preparation of a five-year leasing program that identifies the size, timing, and location of proposed lease sales and that balances the priorities of national energy needs, environmentally sound and safe operations, and fair market return to the taxpayer (BOEM undated). During the second stage, BOEM plans for and conducts the individual lease sales specified in the five-year program. The third stage involves exploration and requires lessees to submit an exploration plan outlining all planned activities for a specific lease, the timing of activities, information concerning drilling, and the location of each well. Lessees must also submit an oil spill response plan. The fourth and final stage of the process is approval of a development and production plan. Environmental analyses are prepared at each stage of development, with opportunities for review and comment by other federal agencies and the public.

The 2012–2017 Five-year Leasing Program

On 28 June 2012 BOEM announced the 2012–2017 proposed final leasing program and issued a notice of availability of a final programmatic environmental impact statement (77 Fed. Reg 40080). For a description of activities leading up to the issuance of the proposed 2012–2017 five-year program, see the Commission's 2010–2011 annual report. Fifteen lease sales were scheduled in the proposed final program, including two lease sales in a portion of 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 Sea and Chukchi Sea, and a special lease sale in Cook Inlet (Figures V-2 and 3). BOEM did not include lease sales for the Atlantic or other areas of the Pacific in the 2012–2017 five-year leasing program, instead focusing lease sales on those areas with the highest known resource potential.[4]

3 On 19 May 2010, the DOI initiated the restructuring of the Minerals Management Service to split three potentially conflicting missions—energy development, enforcement, and revenue collection. In June 2010, as an interim measure, the MMS was renamed the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE). The formal reorganization into the current structure was finalized in October 2011.

4 http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Leasing/Five_Year_Program/2012-2017_Five_Year_Program/Factsheet.pdf (accessed 30 September 2013)

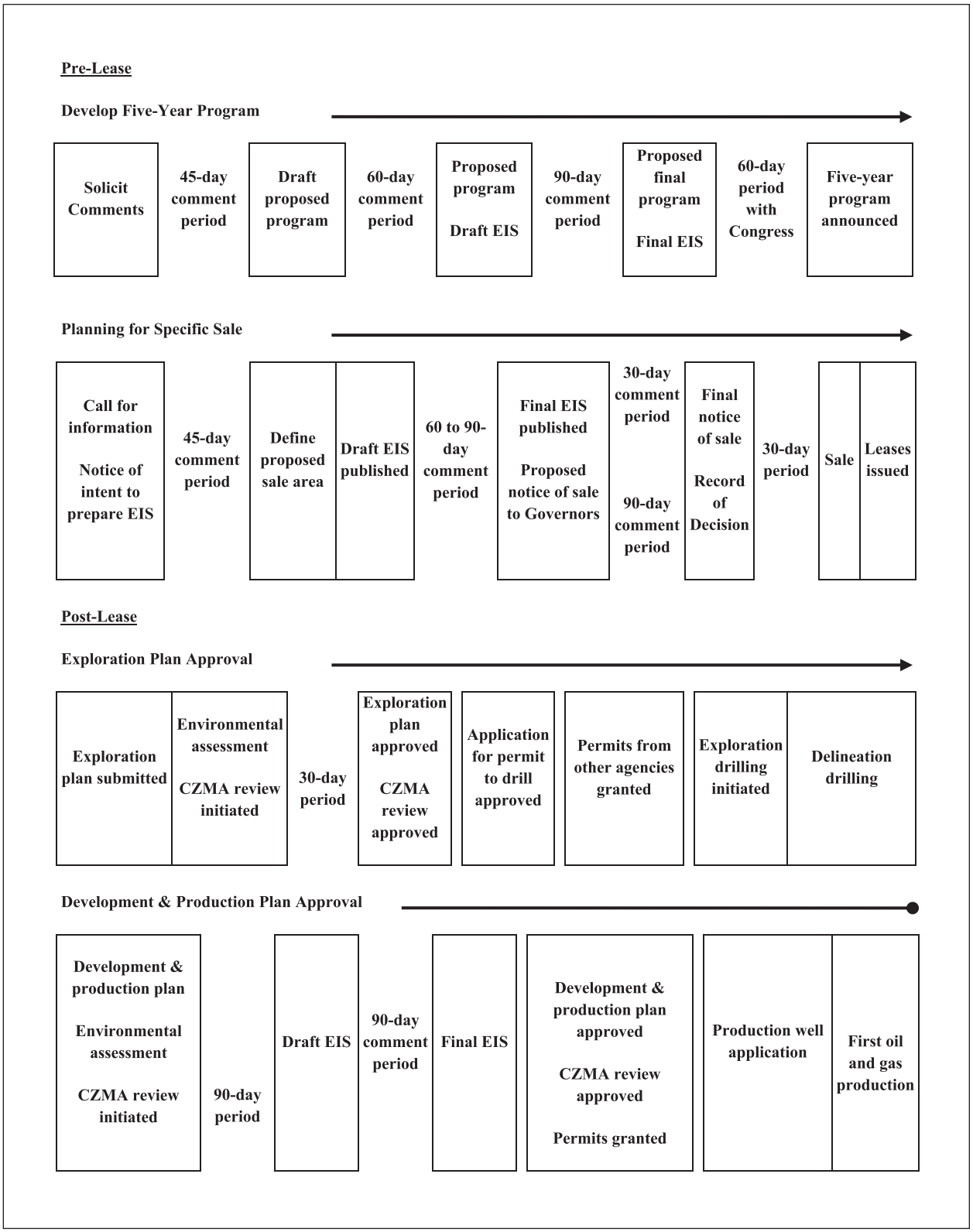

Figure V-1. The steps involved in planning, leasing, exploration, and development of oil and gas resources, under the Outer Continental Shelf Lands Act. (Source: BOEM); EIS = Environmental Impact Statement; CZMA = Coastal Zone Management Act

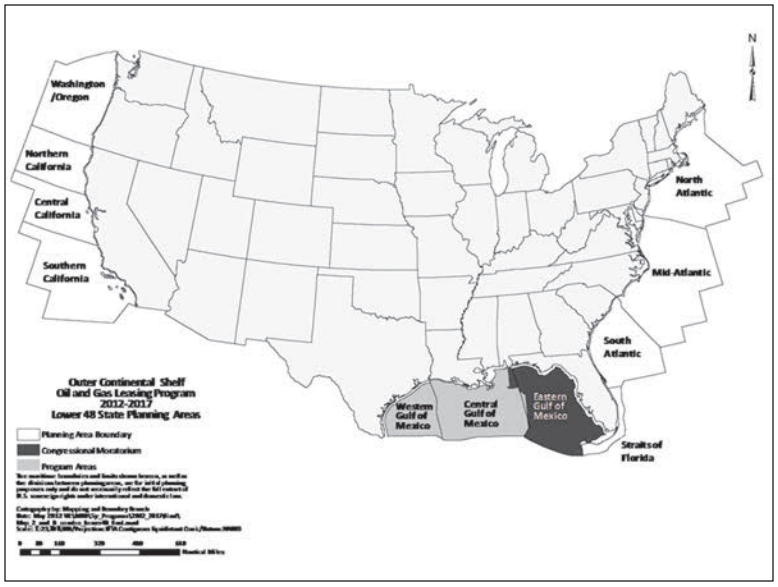

Figure V-2. Outer Continental Shelf Oil and Gas Leasing Program 2012–2017, lower 48 state planning areas. (Source: BOEM)

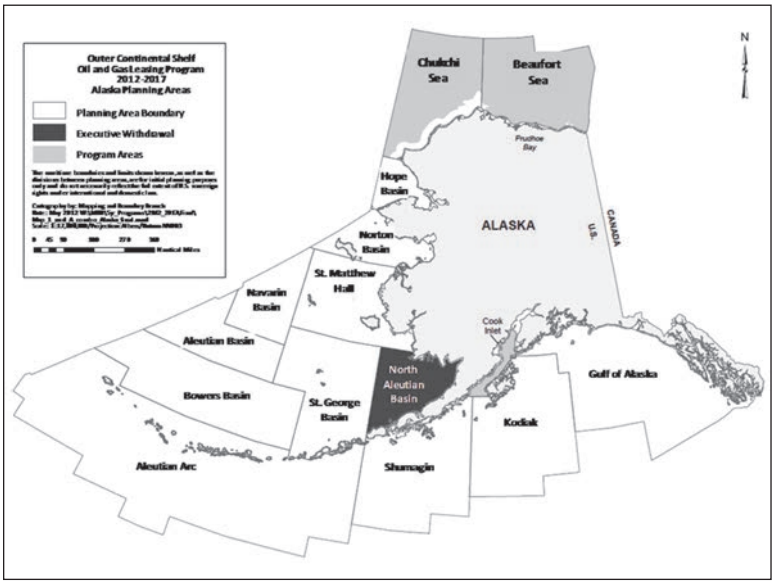

Figure V-3. Outer Continental Shelf Oil and Gas Leasing Program 2012–2017, Alaska planning areas. (Source: BOEM)

Stages of Oil and Gas Development and Key Risk Factors for Marine Mammals

The National Environmental Policy Act (NEPA) 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 that are expected to occur in the past, present, and reasonably foreseeable future. To be comprehensive, those analyses must also include the expected physical, biological, and ecological effects of climate change.

Oil and gas development in the marine environment proceeds in stages that parallel the regulatory process outlined in OCSLA (see previous section). Table V-1 summarizes the environmental effects of concern at each stage of oil and gas development. A more detailed summary of activities associated with each stage of development and the environmental effects of concern for marine mammals was provided in the Commission's 2010–2011 annual report.

Mitigation, Monitoring, and Reporting Requirements for Oil and Gas Activities

Sections 101(a)(5)(A) and (D) of the Marine Mammal Protection Act provide a mechanism for the National Marine Fisheries Service and the Fish and Wildlife Service to authorize 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. Takes may be authorized provided they are (1) small in number, (2) have no more than a negligible impact on marine mammals, and (3) have no unmitigable adverse impact on the availability of marine mammals for subsistence uses. The National Marine Fisheries Ser-

Table V-1. Stages of oil and gas development and associated activities, the purpose of each activity, and potential environmental effects of concern for marine mammals

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/injury from seismic sound source Disturbance from vessel and aircraft activity Collisions with vessels
Sediment sampling	Coring or sampling of surface and subsurface sediments to determine geophysical properties	Physical alteration or disturbance of bottom habitat
High-resolution site clearance/shallow hazards surveys	Provide imagery of the sub-seafloor to locate and characterize geological features and hazards, biologically sensitive areas, and archaeological resources	Acoustic disturbance from sound source Disturbance from vessel activity Collisions with vessels
Exploratory drilling	Confirm presence of hydrocarbons; characterize physical properties of reservoir to determine economic feasibility	Disturbance from vessel and aircraft activity Collisions with support vessels 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
Vertical seismic profiling	Determine the structure of a particular petroleum-bearing zone	Acoustic disturbance/injury from seismic sound source Collisions with vessels
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		
High-resolution site clearance/shallow hazards surveys	Provide imagery of the sub-seafloor to locate and characterize geological features and hazards, biologically sensitive areas, and archaeological resources	Acoustic disturbance from sound source Disturbance from vessel and aircraft activity Collisions with vessels
Platform and equipment installation	Install and anchor drilling platform and equipment to seafloor to support long-term hydrocarbon production, storage, and offloading	Acoustic disturbance/injury from pile driving or platform construction Disturbance from vessel and aircraft activity Collisions with vessels Physical alteration or disturbance of bottom habitat Discharges prior to a disposal well being serviceable 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 Disturbance from vessel and aircraft activity

Stage of Oil and Gas Development and Activity	Purpose of Activity	Environmental Effects of Concern for Marine Mammals
Pipeline installation	Install pipeline for transport of hydrocarbons to an onshore facility port or refinery	Acoustic disturbance/injury from pile driving (where applicable)
		Disturbance from vessel and aircraft activity
		Physical alteration or disturbance of bottom habitat or ice and mobilization of sediments (and potentially toxins) into the water column
		Pollution from trash and debris
		Oil and gas spills and leaks
PRODUCTION AND TRANSPORT OF HYDROCARBONS		
Seismic surveys	Monitor distribution, volume, and pressure of the reserve during extraction	Acoustic disturbance/injury from seismic sound source
		Disturbance from vessel and aircraft activity
		Collisions with vessels
Drilling	Extraction of oil and gas reserves for refinement and commercial sale	Disturbance from vessel and aircraft activity
		Collisions with support vessels
		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
		Reef effects of platforms (e.g., attraction of certain fish and other species, changes in community composition and dynamics)
Transport	Transport of hydrocarbons to port or processing site via pipelines or tankers	Disturbance from vessel activity (tankers)
		Oil and gas spills and leaks (tankers and pipelines)
		Attraction of certain fish and other species, changes in community composition and dynamics
		Invasive species from tankers
DECOMMISSIONING AND SITE CLEARANCE		
Explosive removal	Remove structures or equipment from seafloor	Acoustic disturbance/injury from explosives
		Disturbance from vessel and aircraft activity
		Pollution from trash and debris
		Oil and gas spills and leaks
Non-explosive removal	Remove 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	Reef effects of platforms (e.g., attraction of certain fish and other species, changes in community composition and dynamics)

vice and the Fish and Wildlife Service encourage action proponents to apply for an incidental take authorization when proposed activities may result in Level A (injury) or Level B (harassment) takes.[5] Take authorizations for oil and gas activities typically include a suite of mitigation, monitoring, and reporting measures with which operators must comply to prevent or reduce the adverse effects of oil and gas development.

Mitigation measures for seismic or other sound-generating activities 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,[6] and restricting operations during nighttime or low-visibility conditions. To minimize the probability of vessel strikes, vessels may be required to slow down within a certain distance from marine mammals. Aircraft operating in an area may be required to fly above a certain altitude to avoid disturbing marine mammals that are at or near the surface. Proposed activities also may be prohibited in sensitive areas at sensitive times (such as during calving, feeding, resting, or during subsistence hunting in Alaska). The development of general and site-specific mitigation measures is based to the extent possible on observations of animals exposed to various industrial activities and on the limited understanding of their sensory abilities and behavior. Nevertheless, the effectiveness of mitigation efforts is often uncertain.

Monitoring for the presence of marine mammals in the areas around and potentially affected by an action serves two main functions. First, it may be necessary to prompt mitigation measures. For example, visual or acoustic monitoring is necessary to determine when marine mammals are too close to a sound source (i.e., within the Level A exclusion zone), thereby triggering a power-down or shutdown of sound production. Second, monitoring provides information that may be helpful for documenting the effects of an activity, such as the number of marine mammals taken and the nature of the takes. For sound-producing activities, the area to be monitored is usually all of the Level A exclusion zone and all or some portion of the Level B disturbance zone (depending on the size of the zone). The size of this area 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 or when the take zone is too large to monitor visually).

Marine mammal sightings are required to be documented and reported to the agency that issued the incidental take authorization (i.e., NMFS or FWS) as part of the take authorization. Reporting is typically required periodically during a project and at its completion. Immediate reporting is required if a dead or seriously injured marine mammal is found in the vicinity of an operation, with immediate suspension of operations if the death or injury might have been caused by the operation.

Regional Differences in Mitigation and Authorization of Marine Mammal Takes

The approaches used to mitigate and authorize takes of marine mammals incidental to oil and gas operations differ by region of operation (Alaska, Gulf of Mexico, California/Oregon/Washington). These differences reflect the history and pace of development in each region, the type and level of oil and gas

5 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."

6 Under current NMFS 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 arrays are judged to be within the marine mammal exclusion zones in the Gulf of Mexico (http://www.boem.gov/Regulations/Notices-To-Lessees/2012/2012-JOINT-G02-pdf.aspx, accessed 30 September 2013).

activities, the marine mammals present, their status under the Marine Mammal Protection Act and the Endangered Species Act, and the protections provided under the Marine Mammal Protection Act for subsistence and cultural use of marine mammals in Alaska. For example, the Chukchi and Beaufort Seas planning areas in the Arctic Ocean have recently experienced an increase in offshore oil and gas exploration after only limited activity during the last two decades. Concerns about the effects of oil and gas development on the Arctic Ocean ecosystem and Alaska Native communities, and a push to ensure that oil- and gas-related exploration activities are compliant with the Marine Mammal Protection Act, the Endangered Species Act, and other environmental regulations, especially after the *Deepwater Horizon* oil spill, have prompted an unprecedented level of scrutiny of planning in the Arctic. In contrast, the Gulf of Mexico region has undergone more than six decades of consistent oil and gas development, much of it conducted without significant environmental regulation. As a result, efforts by NMFS and the BOEM to impose more stringent regulations to govern incidental takes of marine mammals in the Gulf of Mexico have been met with some resistance by industry.

The following is a discussion of management approaches used to mitigate and regulate takes of marine mammals in the Alaska and Gulf of Mexico outer continental shelf (OCS) planning areas for different types of oil and gas activities, efforts being taken to address regulatory shortcomings and inconsistencies, and potential approaches that may be taken in the future in the Atlantic and California/Oregon/Washington planning areas if and when oil and gas activities in those areas increase.

Seismic surveys: The first efforts to regulate takes of marine mammals incidental to seismic surveys in the Gulf of Mexico region began in 2002. At that time, the former MMS petitioned NMFS for rulemaking under section 101(a)(5)(A) of the MMPA to authorize any potential take of sperm whales incidental to conducting seismic surveys during oil and gas exploration activities (68 Fed. Reg. 9991). NMFS subsequently issued a notice of intent to prepare an environmental impact statement (EIS) for the requested authorization (69 Fed. Reg. 67535), but an EIS was never published. In April 2011 BOEM (operating at the time as BOEMRE) submitted a revised application to NMFS 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 two agencies were in the process of developing a joint programmatic EIS at the end of 2012. However, the delay in issuing regulations for takes incidental to seismic surveys is disconcerting given the spatial and temporal extent of historical and projected seismic activities in the Gulf (MMS 2004, BOEM 2011) and the associated potential impact on marine mammals.

As an interim measure, BOEM requires seismic survey operators in the Gulf to comply with general (i.e., not site-specific) mitigation, monitoring, and reporting measures to minimize harm to marine mammals through permit conditions established through a Notice to Lessees and Operators (NTL). The NTL for seismic surveys, which was revised in 2012,[7] outlines requirements for the establishment of Level A exclusion zones and Level B harassment zones and associated ramp-up, power-down, and shutdown procedures within those zones. The NTL for seismic surveys also provides guidance on visual monitoring of these exclusion zones by protected species observers and training, data collection, and reporting requirements for those observers. A separate NTL, also revised in 2012,[8] addresses requirements for avoiding vessel strikes of marine mammals and for reporting injured and dead protected species. The mitigation, monitoring, and reporting requirements in these two NTLs are likely to be included and expanded on in the Service's Marine Mammal Protection Act rulemaking for the Gulf.

In preparation for rulemaking, the two agencies convened a workshop in November 2012 in Herndon, Virginia, to solicit information from technical experts and stakeholders regarding appropriate mitigation

7 Notice to Lessees and Operators on Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program (Joint NTL No. 2012-G02, available at http://www.boem.gov/Regulations/Notices-To-Lessees/2012/2012-JOINT-G02-pdf.aspx, accessed 30 September 2013)

8 Notice to Lessees and Operators on Vessel Strike Avoidance and Injured/Dead Protected Species Reporting (Joint NTL No. 2012-G01, available at http://www.boem.gov/Regulations/Notices-To-Lessees/2012/2012-JOINT-G01-pdf.aspx, accessed 30 September 2013)

and monitoring measures for geological and geophysical (i.e., seismic) activities in offshore waters of the Gulf of Mexico. Workshop participants discussed the biological significance of sound to marine mammals and the efficacy, cost-effectiveness, and feasibility of a broad range of mitigation measures. Some of those measures either are currently in use (under interim requirements discussed above) or are new measures being considered, including time-area restrictions, alternative technology (e.g., marine vibroseis), expansion of shutdown requirements to include delphinids, passive acoustic monitoring, and minimum separation distances between concurrent seismic surveys. Participants also discussed key data gaps in understanding of marine mammal abundance, distribution, and behavior, the effects of seismic activity on Gulf marine mammals, and existing and emerging methods and technologies that could be used to fill those gaps. There is a fundamental need for more frequent stock assessment surveys, supplemented by acoustic monitoring of marine mammal movements and distribution. NMFS and BOEM expressed their intent to use the input provided during the workshop to inform agency decisions regarding the rulemaking and to assist in the preparation of environmental compliance documents associated with that rulemaking.

In contrast to the approach used in the Gulf of Mexico, where seismic operators do not currently seek authorizations for incidental takes of marine mammals, seismic operators in Alaska (operating in both the Arctic and Cook Inlet) apply to NMFS and/or FWS for an authorization to take marine mammals incidental to all proposed seismic surveys. NMFS typically issues one-year incidental harassment authorizations and FWS issues five-year incidental take regulations with annual letters of authorizations. Before issuance of an authorization, NMFS and FWS evaluate the potential impact of the proposed seismic survey on marine mammals and prescribe appropriate mitigation and monitoring measures. The Commission regularly comments on the proposed authorizations or regulations and associated applications, paying particular attention to whether they include mitigation, monitoring, and reporting measures that ensure the negligible impact and small numbers requirements of the MMPA are met, as well as requirements for ensuring that the proposed activities will have no unmitigable adverse impact on the availability of marine mammals for subsistence uses. The MMPA requires that, when the proposed activity may affect species or stocks taken for subsistence, the proposed monitoring plans or other research proposals submitted as part of an application for a one-year incidental harassment authorization be reviewed by an independent peer review panel—a process not required for the issuance of five-year incidental take regulations.

In recent years, the oil and gas industry has not conducted any seismic surveys in the OCS planning areas off California, Oregon, and Washington, or in the Atlantic OCS planning areas, although interest in doing so is growing in both areas. The most recent seismic survey of oil and gas reserves off California was a 45-day three-dimensional (3D) survey off Santa Barbara County in 1995. Although BOEM's predecessor, the MMS, published interim guidelines for high-energy seismic surveys off southern California in 1999, these have yet to be applied to oil and gas operations because authorization to carry out additional seismic surveys off California has not been requested.

In the Atlantic, BOEM has received several requests from seismic operators in the last few years to conduct coast-wide seismic surveys in anticipation of future lease sales.[9] The results would be used by industry (and BOEM) to update available geological and geophysical data in areas where such data have been collected previously (see Post et al. 2012 for an assessment of oil and gas resources in the Atlantic as of January 2009) and to acquire first-time data in previously unsurveyed areas to assess the potential of oil and gas and mineral resources. BOEM is taking a programmatic approach under NEPA to reviewing the potential environmental impact of proposed geophysical and geological activities in the Atlantic, and in 2012 issued a draft programmatic EIS evaluating various alternatives for seismic and other high-resolution geophysical surveys in the Mid- and South Atlantic planning areas. More details regarding that draft EIS and Commission comments are provided in the section below.

9 http://www.boem.gov/Oil-and-Gas-Energy-Program/GOMR/GandG.aspx (accessed 30 September 2013)

It is not yet clear what approach will be used in the Atlantic for the authorization of takes of marine mammals incidental to seismic surveys. However, given the low level of activity anticipated, at least initially, and concern regarding the potential impact of seismic surveys on marine mammals and other marine species, it is likely to follow the project-specific application and review process used in Alaska.

Exploratory and production drilling: Considerable exploratory and production drilling occurs routinely in the Gulf of Mexico (Figure V-4) but neither the industry nor BOEM has requested MMPA authorization from NMFS for takes of marine mammals incidental to such activities. In contrast, industry typically submits applications for marine mammal incidental take authorizations for drilling activities in Alaska. NMFS and FWS review those applications and stipulate appropriate mitigation and monitoring measures to be implemented as a condition of issuance of the authorizations.

There is currently drilling and production from 23 platforms in federal waters and 4 platforms in state waters off California. Some vertical seismic profiling of production wells has been conducted off California in the past but none recently. However, the California oil and gas industry has expressed a need for vertical seismic profiling of production wells to support safe and efficient drilling operations. It is not clear what process would be followed for authorizing marine mammal takes incidental to seismic activities, but presumably industry would submit applications to NMFS on a project-specific basis.

Planning for exploratory and production drilling in the Atlantic has not advanced to the point of defining the approach that will be taken for the authorization of incidental takes of marine mammals.

Transportation: As illustrated in Figure V-4, there is a vast network of undersea pipelines throughout the Gulf of Mexico linking the nearly 3,000 oil and gas platforms in the Gulf to facilities on land or offshore.[10] There is also a system of undersea pipelines to transport oil and gas from the 23 federal and 4 state offshore oil production platforms off California to land-based facilities.[11] Three pipelines on the

10 http://www.bsee.gov/Exploration-and-Production/Decomissioning/FAQ.aspx (accessed 30 September 2013)

11 http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Leasing/Regional_Leasing/Pacific Region/Leasing/pacific-ocs-map.pdf (accessed 30 September 2013)

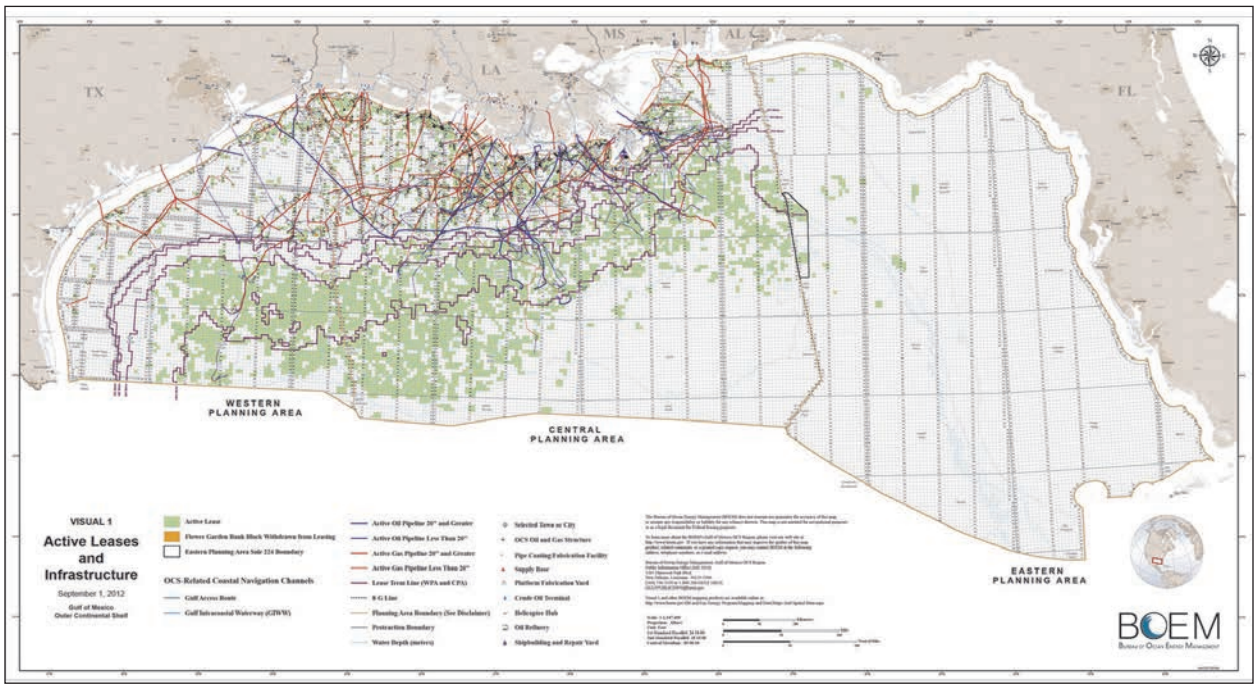

Figure V-4. Active oil and gas leases and infrastructure in the Gulf of Mexico planning areas. (Source: BOEM)

North Slope of Alaska connect existing offshore oil production facilities to land, and new pipelines may be needed to transport oil and gas to land from future Chukchi and Beaufort Sea oil and gas production sites. Tankers are used currently to transport natural gas produced in Cook Inlet, Alaska; however, a right-of-way lease that would allow transport of natural gas eastward across Cook Inlet via an underwater pipeline was being considered by the Alaska Department of Natural Resources at the end of 2012.[12]

There are eight facilities in offshore waters that are used to import liquefied natural gas (LNG) into the United States; all are located in the Atlantic and Gulf of Mexico. A ninth facility, Port Dolphin Deepwater Port, is under construction off Tampa Bay, Florida. There is one LNG export facility in Cook Inlet, Alaska, but it was inactive in 2012; other export facilities are in the permitting and/or construction process. LNG facilities typically seek authorization from NMFS under section 101(a)(5) of the MMPA for harassment of marine mammals incidental to construction and/or operation activities. Offshore LNG activities fall under the jurisdiction of the U.S. Coast Guard.

Decommissioning: OCSLA requires oil and gas operators to remove or "decommission" platforms and other seafloor structures from their leased areas within one year of lease termination or when a structure has been determined to be obsolete or unusable. Oil and gas platforms are decommissioned using either explosive or non-explosive severance techniques, although explosive removal is more common (approximately 63 percent of removals in the Gulf involved the use of explosives). Underwater explosives generate potentially damaging pressure waves and acoustic energy that can harm marine mammals and other species (Table V-2). In 2008, at the request of MMS (now BOEM), NMFS issued five-year regulations authorizing oil and gas operators to take small numbers of marine mammals incidental to explosive severance activities at offshore oil and gas structures in the Gulf of Mexico (73 Fed. Reg. 34875). At the time of its application to NMFS for incidental take regulations, MMS estimated that between 170 and 273 explosive well-severance activities would occur each year. In the regulations, NMFS authorized, over the five-year time frame for the regulations, a total incidental take of five bottlenose dolphins, one Atlantic spotted dolphin, and one pantropical spotted dolphin by Level A harassment and up to 457 marine mammals of 11 species by Level B harassment. Those regulations are due to expire in July 2013.

Oil and gas production off California is slowing down[13] and existing platforms will eventually reach the end of their useful life. Decommission planning was initiated in the 1990s and revisited in 2007 and 2008 (California Ocean Science Trust undated); decommissioning options included both complete removal of the rig and partial removal with conversion of the remaining structure to an artificial reef (also known as "Rigs-to-Reefs"). However, new developments in horizontal (or slant) drilling technology have allowed access to more reserves from existing platforms, which, coupled with the high demand for oil, have delayed decommissioning off California at least for the near future.

Significant 2012 Oil and Gas Activities by Region/Planning Area and Commission Comments

The Commission reviewed and commented on proposed oil and gas activities in the Alaska (Arctic and Cook Inlet), Atlantic, and Gulf of Mexico planning areas in 2012. The issues and Commission comments are summarized in this section.

Alaska/Arctic

NMFS Draft EIS on the effects of oil and gas activities on Arctic marine mammals: On 30 December 2011 NMFS issued a notice of availability of a draft EIS on the effects of oil and gas activities in the Arctic Ocean. The draft evaluated alternatives for authorizing the take of marine mammals incidental to oil and gas exploration (seismic and drilling) activities in the Arctic Ocean. Two levels of activity were contemplated, as shown in Table V-2.

12 http://www.alaskapublic.org/2012/12/10/cook-inlet-energy-proposes-pipeline-to-link-west-side-of-cook-inlet/ (accessed 30 September 2013)

13 http://www.data.bsee.gov/homepg/data_center/production/ocsprod.asp (accessed 30 September 2013)

Table V-2. Summary of exploration activity levels considered in the NMFS draft EIS for oil and gas exploration activities in the Arctic. Note: Alternative 1 would have no actions authorized; Alternative 4 would include time-area closures[14]; Alternative 5 would include the use of alternative technologies. (Source: National Oceanic and Atmospheric Administration (NOAA) 2012a, adapted from pages 4-6)

Level 1 Exploration Activities (Alternative 2)	Level 2 Exploration Activities (Common Elements of Alternatives 3, 4, and 5)
Two 2D/3D deep-penetration towed-streamer seismic surveys in the Beaufort Sea and **two** of the same types of surveys in the Chukchi Sea, per year	**Three** 2D/3D deep-penetration towed-streamer seismic surveys in the Beaufort Sea and **four** of the same types of surveys in the Chukchi Sea, per year
One in-ice towed streamer 2D seismic survey (using icebreaker) in the Beaufort Sea and **one** of the same types of surveys in the Chukchi Sea, per year	**One** in-ice towed streamer 2D seismic survey (using icebreaker) in the Beaufort Sea and **one** of the same types of surveys in the Chukchi Sea, per year
One ocean bottom cable seismic survey in the Beaufort Sea, per year	**Two** ocean bottom cable seismic surveys in the Beaufort Sea, per year
One on-ice vibroseis (seismic) survey in the Beaufort Sea, per year	**One** on-ice vibroseis (seismic) survey in the Beaufort Sea, per year
Three site clearance and high-resolution shallow hazards survey programs in the Beaufort Sea and **three** of the same types of surveys in the Chukchi Sea, per year	**Five** site clearance and high-resolution shallow hazards survey programs in the Beaufort Sea and **five** of the same types of surveys in the Chukchi Sea, per year
One exploratory drilling program in the Beaufort Sea and **one** exploratory drilling program in the Chukchi Sea, per year	**Two** exploratory drilling programs in the Beaufort Sea and **two** exploratory drilling programs in the Chukchi Sea, per year

14 Time/area closures considered under Alternative 3 of the EIS include: Camden Bay, Barrow Canyon/ Western Beaufort Sea, Shelf Break of the Beaufort Sea, Hannah Shoal, Kasegaluk Lagoon/ Ledyard Bay Critical Habitat Unit

The Commission provided comments on the draft EIS in a letter to NMFS dated 28 February 2012. In its letter, the Commission recommended that NMFS work with BOEM to conduct site-specific NEPA analyses and ensure that the necessary information is available to estimate takes as accurately as possible and that these analyses be made available for public review before NMFS makes its final determination. The Commission recommended that NMFS work with BOEM to include a broader range of alternatives in the EIS to ensure that oil and gas activities have no more than a negligible impact on marine mammal species and stocks and will not have an adverse impact on the Alaska Native communities that depend on marine mammals for subsistence. Such alternatives should include a phased approach for increasing oil and gas activities, avoidance of redundant seismic surveys, development of a soundscape approach to evaluating and mitigating effects, and caps on noise or activity levels.

The Commission further recommended that NMFS work with BOEM to establish and fully support the collection and synthesis of scientific data and traditional knowledge necessary to evaluate and predict the long-term cumulative effects of oil and gas activities on Arctic marine mammals and their environment. NMFS should evaluate and determine whether each of the alternatives meets the MMPA requirements for issuance of incidental take authorizations and gather additional information as necessary. The Commission recommended that NMFS incorporate a broader list of standard mitigation measures for oil and gas-related incidental take authorizations in the Arctic (see the Commission's letter for more details) and work with BOEM and industry to improve the effectiveness of mitigation and monitoring measures. Finally, the Commission recommended that NMFS work with other federal, state, and local agencies and entities to develop a comprehensive, long-term monitoring program for the Arctic ecosystem, including marine mammal populations.

Seismic surveys: In 2012 the Commission reviewed two requests for MMPA small-take authorizations associated with Arctic seismic surveys for oil and gas exploration. The first was for a seismic survey by BP Exploration (Alaska) Inc. in the Simpson Lagoon area of the Alaska Beaufort Sea during the 2012 open-water season (77 Fed. Reg. 25830). The second was for an in-ice seismic survey by ION Geophysical Inc. in the Alaska Beaufort and Chukchi Seas between October and December 2012.

In its comments on both the BP and ION seismic surveys, the Commission recommended that NMFS use maximum, rather than average, density estimates to calculate takes of marine mammals to account for uncertainties regarding density data for Arctic marine mammals. For ION's proposed in-ice survey, the Commission's primary concerns were the inadequacy of visual monitoring during the poor visibility conditions expected, and NMFS's assumption that the majority of marine mammals would take evasive action to avoid the airgun array and exposure to harmful sound levels that could result in Level A harassment. To enhance detection capabilities in low visibility conditions, the Commission recommended that NMFS require ION to use active and passive acoustic monitoring in addition to visual monitoring. Regarding the calculation of Level A takes, the Commission recommended that NMFS (1) revise the estimated number of Level A harassment takes to include all marine mammals that might be exposed to received levels greater than or equal to 180 and 190 dB re 1 µPa (for cetaceans and pinnipeds, respectively), (2) account for all of the uncertainty in its estimation approach, including animals that are present but not observed, (3) provide a scientific basis for any conclusions about the animals' responses to the airguns, and (4) base its negligible impact determination on the revised estimated number of Level A harassment takes. A more detailed list of the Commission's recommendations, and the agencies' responses, is in Appendix A (see letters dated 1 June and 21 September, respectively).

Shell's 2012 exploratory drilling season: Shell submitted two exploration plans in 2012—one for the MV *Noble Discoverer* to drill 70 miles offshore in the Chukchi Sea and one for the MV *Kulluk* to drill 12 miles offshore in the Beaufort Sea. Shell submitted exploration plans previously for those areas, in 2010, but the *Deepwater Horizon* oil spill caused drilling plans to be delayed. Exploration plans were revised and resubmitted for the 2011 open-water season, but drilling did not occur in 2011 due to delays in getting final approval for an air quality permit. During those delays, Shell revised its oil spill response plans, updated its equipment, and developed a sub-sea containment system to capture and recover oil in the event of a well control incident (blowout).

BOEMRE (BOEM's predecessor) conditionally approved Shell's exploration plan for 2012 for the Camden Bay area of the Alaska Beaufort Sea on 4 August 2011. The conditional approval stated that no drilling could occur until BOEMRE had approved Shell's application for a permit to drill and that no drilling could occur beyond the bottom of each casing string (or length of pipe within a wellbore) without BOEMRE approval. Shell was required to have a plan in place for drilling a relief well as needed and to have its planned well-containment system in place and approved for use in worst-case discharge conditions (such as a very large blowout). BOEMRE further required Shell to obtain required Clean Air Act permits from the Environmental Protection Agency (EPA), consult with NMFS and FWS on takes of endangered species, obtain marine mammal incidental take authorizations from NMFS and FWS, and develop and implement a plan of cooperation with Alaska Natives to prevent "unreasonable conflicts with subsistence activities."[15] To prevent conflicts with the fall bowhead whale hunt, BOEMRE required that Shell (1) have a bowhead whale monitoring plan in place, (2) cease all drilling activities by 25 August, and (3) not resume drilling activities until the Nuiqsut and Kaktovik whale hunts were completed.

BOEM issued its conditional approval for Shell's exploration plan for 2012 for the Chukchi Sea on 16 December 2011. The conditional approval stated that no drilling could occur until BSEE approved Shell's application for a permit to drill. It also required Shell to have an approved oil spill response plan in place before drilling, with certification by BSEE that Shell's planned well-containment system had been tested for worst-case discharge conditions. It further required Shell to cease drilling into "zones capable of encountering flowing liquid hydrocarbons in measurable quantities"[16] by 24 September 2012, 38 days before the first date of ice

15 Letter from BOEMRE to Shell dated 4 August 2011, available at http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Plans/Regional_Plans/Alaska_Exploration_Plans/2012_Shell_Beaufort_EP/2011_0804_soi.pdf (accessed 30 September 2013)

16 Letter from BOEM to Shell dated 16 December 2011, available at http://www.boem.gov/uploadedFiles/2011_12_16_10_58_33_BOEM%20Letter%20of%20Conditional%20Approval%20to%20Shell%20for%20Chukchi%20Sea%20Exploration%20Plan%281%29.pdf (accessed 30 September 2013)

encroachment over the drill site, which in 2012 was projected to be 1 November. The requirement to cease drilling by 24 September was intended to provide Shell time, in the event of a loss of well control or other discharge event, to implement cap and containment and clean-up operations before the onset of sea ice formation. As in the Beaufort Sea, BOEM required Shell to obtain the necessary Clean Air Act permits from the EPA, consult with NMFS and FWS on takes of endangered species, obtain marine mammal incidental take authorizations from NMFS and FWS, and develop a plan of cooperation to prevent conflicts with subsistence activities.

The Commission sent a letter to DOI, BOEM, and BSEE on 2 April 2012 regarding Shell's planned drilling operations in the Beaufort Sea. The Commission recommended that BOEM and BSEE require Shell to cease drilling and associated operations in the Beaufort Sea in mid-September to reduce the possibility of having to respond to a large oil spill in icy Arctic conditions. The Commission further recommended that BSEE (1) develop and impose on the industry appropriate oil spill response standards, (2) confirm the availability of the necessary response personnel and equipment, (3) and verify that the responders can meet the standards through both tabletop and field exercises, with such drills performed prior to and during drilling activities. The Commission recommended that BSEE assess Shell's performance on the drills using specific performance measures established and verified by BSEE as adequate for the conditions that may occur during an actual oil spill. The Commission did not receive a response to this letter from either BOEM or BSEE.

Drilling went forward in 2012 as planned although a series of operational issues delayed the mobilization of Shell's drilling fleet to the Arctic and prevented Shell from meeting its exploration objectives by the end of the season. For example, in May 2012, days before the *Noble Discoverer* drill ship was to leave Seattle for the Arctic, a U.S. Coast Guard inspection found 23 deficiencies with the vessel, including problems with the bilge water management system, ventilation, electric system, and ship's engine. A similar inspection of the MV *Kulluk* drilling rig found 19 deficiencies in electrical and maintenance systems.[17] Then in July the *Noble Discoverer* went adrift in stiff winds in Alaska's Dutch Harbor after its anchor failed to hold. Tug boats were called in to assist.[18] Vessel repairs delayed the Coast Guard's final inspection and permitting of the vessel.[19]

On 30 August 2012 BSEE announced that Shell could proceed with certain preparatory drilling activities in the Chukchi Sea, including the creation of a mudline cellar and drilling to set the first two strings of casing into shallow non-oil-bearing zones. A similar authorization was approved for the Beaufort Sea on 20 September. However, BSEE withheld authorization for drilling into oil-bearing zones (i.e., deeper than 427 m, or 1,400 feet, below the seabed) until Shell's oil spill containment was certified. On 9 September Shell began drilling a preparatory well in the Chukchi Sea but had to halt drilling a day later because of possible risk to the operation from a nearby ice floe.

On 10 September 2012 Shell began testing its oil spill containment barge and the associated containment dome (Figure V-5). During testing, the dome became unhooked from some of the winches used to maneuver it underwater. Then a remote-controlled submarine became entangled in some of the barge's anchor lines; divers worked for about 24 hours to rescue the submarine. On the fifth day of testing, as the dome was being lowered to the sea floor, it began descending too quickly and was crushed when its buoyancy chambers were breached.[20]

With no functional oil spill containment system on site, Shell notified BSEE that it would not drill into potentially oil-bearing zones in either the Beaufort or Chukchi Sea during the 2012 season. Shell resumed drilling of a partial well, or "top hole," in the Chukchi Sea on 23 September. On 3 October Shell began drilling a partial well at the Beaufort Sea Camden Bay site. Drilling activities in both areas

17 http://www.cbsnews.com/8301-505263_162-57562007/coast-guard-pursuing-investigation-into-alaskan-drilling-ship/ (accessed 30 September 2013)

18 http://articles.latimes.com/2012/jul/15/nation/la-na-nn-shell-discoverer-drifts-20120715 (accessed 30 September 2013)

19 http://www.adn.com/2012/08/16/2589991/problems-continue-for-shells-offshore.html (accessed 30 September 2013)

20 http://www.kuow.org/post/sea-trial-leaves-shells-arctic-oil-spill-gear-crushed-beer-can (accessed 30 September 2013)

Figure V-5: Shell's Arctic oil spill containment dome (capping stack), prior to testing. (Source: Shell)

ended on 31 October, and Shell subsequently moved its equipment out of the Arctic.

On 21 December 2012 the *Kulluk* and its tow ship, the MV *Aiviq*, left Dutch Harbor, Alaska, for Seattle, but on 27 December, the *Aiviq's* towlines parted in heavy seas and the *Kulluk* went adrift south of Kodiak Island. After re-establishing the tow, the *Aiviq* lost power and both vessels went adrift. The Coast Guard cutter *Alex Haley* established a tandem tow of both vessels later that day but the towline subsequently parted and fouled the cutter's propeller. The *Aiviq* regained power but was unable to rescue the drifting *Kulluk*. The rig ran aground on 31 December near Sitkalidak Island off the southeastern shore of Kodiak Island (Figure V-6). There were more than 140,000 gallons of diesel oil onboard and about 12,000 gallons of lube oil and hydraulic fluid, but none spilled during the grounding.[21]

These and other difficulties experienced during the 2012 season raise significant concerns regarding Shell's overall readiness for oil drilling in the Arctic. Shell's drilling plans for 2013 and beyond had yet to be confirmed at the end of 2012.

Alaska/Cook Inlet

Lease Sale 244: The DOI identified Lease Sale 244 in the federal waters of Cook Inlet, Alaska, as a potential special interest lease sale in the 2012–2017 proposed five-year leasing program. On 27 March 2012 it published a request for interest in the lease sale. The Commission provided comments to BOEM on this request for interest in a letter dated 7 May 2012. The Commission was concerned that the lease sale may have adverse impacts on the declining Cook Inlet beluga whale population, especially considering that the effects of oil and gas development may be exacerbated by other risk factors in Cook Inlet, including vessel traffic, coastal development, construction, toxic contaminants, noise disturbance, military operations, competition with fisheries for prey, habitat modification, waste discharges, and urban runoff. The Commission recommended that BOEM defer the proposed lease sale until such time as it can, with reasonable confidence, confirm that oil and gas activities would not likely jeopardize the survival or recovery of the Cook Inlet beluga whale population. The Commission recommended that if BOEM decided to go forward with the lease sale

Figure V-6. A Coast Guard helicopter delivers personnel to Shell's conical drilling unit MV Kulluk, just prior to its grounding southeast of Kodiak Island. (Source: U.S. Coast Guard)

21 http://www.adn.com/2012/12/30/2738222/shell-drill-rig-adrift-again-in.html#storylink=cpy (accessed 30 September 2013)

despite the potential risk to the beluga whale population, BOEM restrict the lease sale to the southernmost portions of the Cook Inlet planning area to avoid displacement of beluga whales from critical habitat.

Atlantic

BOEM Draft Programmatic EIS for geophysical and geological activities: In March 2012 BOEM issued a draft programmatic EIS to evaluate alternatives for conducting geological and geophysical (including seismic) surveys in the Mid- and South-Atlantic planning areas and adjacent waters (Figure V-7) in anticipation of future lease sales. The Commission provided comments to BOEM on the draft programmatic EIS in a letter dated 2 July 2012. The Commission recommended that BOEM expand the geographic boundary of the proposed time-area restrictions on airgun seismic surveys under Alternative B to include all coastal waters out to 55 km from shore to better protect mothers and calves and migrating right whales. The Commission recommended that BOEM require passive acoustic monitoring to provide additional assurance that marine mammals in the survey area would be detected and to provide a more accurate estimate of the number of animals exposed to airgun noise. The Commission's view was that passive acoustic monitoring should be required for all acoustic surveys that have the potential to take marine mammals by harassment, including high-resolution geophysical surveys.

The Commission reiterated previous recommendations to BOEM that it (1) maximize the utility of existing seismic survey data while minimizing the number and impact of new seismic surveys, (2) promote the further development, testing, and use of alternative, less harmful technologies to collect the required geophysical information, and (3) work with other agencies with related responsibilities, the oil and gas industry, scientists, conservation organizations, and other stakeholders to develop standards for baseline data collection and to ensure the availability of adequate baseline information before moving forward with the proposed geological and geophysical surveys. Because the data used to estimate takes of marine mammals in the Mid- and South-Atlantic planning areas and adjacent waters were based on incomplete or outdated information, the Commission recommended that BOEM provide confidence limits and sources of potential bias associated with the density and take estimates calculated for each species, and that it include in its calculation of estimated takes an assessment of all potential sound sources associated with geological and geophysical surveys, including exploratory drilling and vessel sounds. The Commission made a number of other recommendations aimed at improving BOEM's proposed mitigation, monitoring, and reporting measures. BOEM expects to publish a

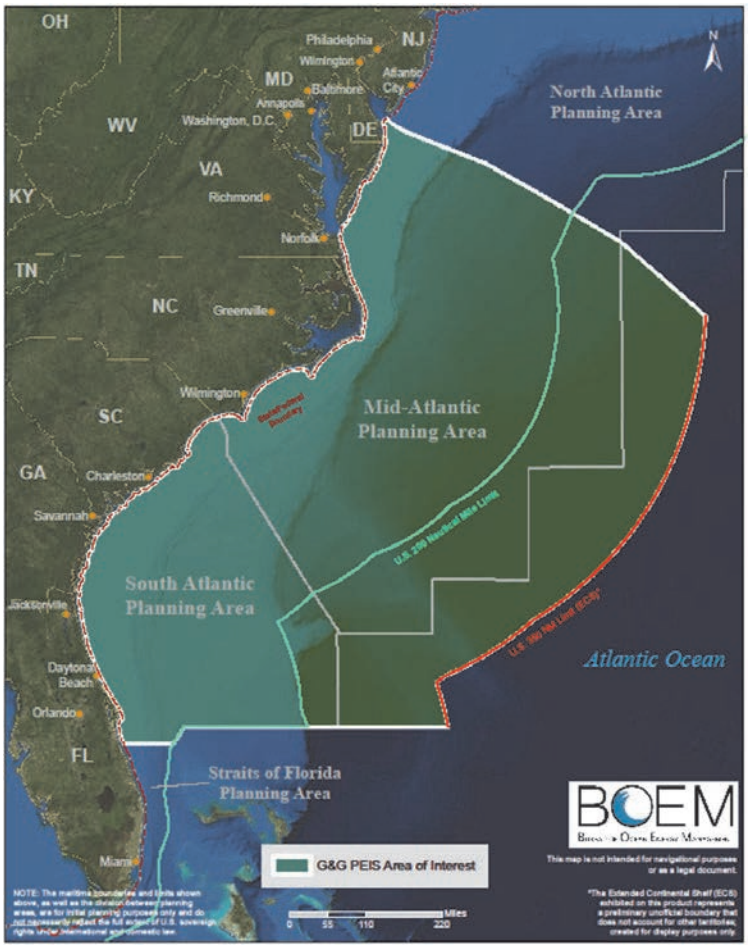

Figure V-7: Atlantic Outer Continental Shelf geological and geophysical programmatic area of interest. (Source: BOEM)

final programmatic EIS for geological and geophysical activities in the Atlantic by the end of 2013.

Gulf of Mexico

BOEM Draft EIS for proposed Gulf of Mexico lease sales: On 30 December 2011 BOEM issued a notice of availability of a draft EIS for proposed oil and gas lease sales in the Gulf of Mexico Western and Central Planning Areas (76 Fed. Reg. 82319). The draft evaluated the environmental impact of the five annual lease sales proposed for each planning area as part of the Administration's proposed Outer Continental Shelf Oil and Gas Leasing Program for 2012–2017.

The Commission provided comments to BOEM on its draft EIS in a letter dated 15 February 2012. The Commission recommended that BOEM review and incorporate the priorities for research and monitoring outlined in the Commission's Statement of Research Needs (MMC 2011) into the EIS. The Commission also recommended that BOEM work with NMFS, FWS, academia, and industry partners to develop a comprehensive monitoring program for the Gulf of Mexico ecosystem, including its marine mammal populations, and revise its EIS to include alternative strategies for seismic studies that would avoid unnecessary redundancy and thereby minimize associated ecosystem disturbance.

The final EIS was issued on 6 July 2012 (77 Fed. Reg. 40080), and in it BOEM indicated it was working with NMFS on a separate EIS focused specifically on seismic activities in the Gulf of Mexico (see above). That EIS will include consideration of alternative technologies, as well as other strategies to minimize the potential impact on natural resources.

BOEM published a Call for Information and Notice of Intent to prepare an EIS for a proposed lease sale in the Gulf of Mexico Eastern Planning Area in 2011 (76 Fed. Reg. 71595); a draft EIS will be made available in 2013 in advance of the lease sale, to be held in 2014.

Lease Sales: BOEM conducted two lease sales in the Gulf of Mexico in 2012:

- Lease sale 216/222 in the Central Planning Area was conducted on 20 June 2012 (77 Fed. Reg. 4360; 77 Fed. Reg. 29683). It was the final lease sale of the 2007–2012 five-year leasing program.
- Lease sale 229 in the Western Planning Area was conducted on 28 November 2012 (77 Fed. Reg. 43355; 77 Fed. Reg. 65408). It was the first lease sale of the 2012–2017 five-year leasing program.

Port Dolphin LNG Deepwater Port: The Commission reviewed an application for an MMPA Letter of Authorization associated with construction and operation activities for the Port Dolphin LNG Deepwater Port off Tampa Bay, Florida, and provided recommendations to NMFS on 25 October 2012 (see Appendix A for more details). NMFS had yet to issue the authorization at the end of 2012.

Ongoing Research to Address Data Needs for Oil and Gas Development

To address data needs for oil and gas development on the outer continental shelf, the following marine mammal research projects, listed by region, were initiated, ongoing, or completed by one or more federal agencies in 2012.[22] This is not an exhaustive list of the many federally funded studies underway to increase understanding of physical and biological processes in the marine environment and the potential effects of oil and gas activities on prey species and habitat.

Alaska (in order of start date):

- *Populations and Sources of Recruitment in Polar Bears:* Beginning in 2005 BOEM funded researchers at the University of Alberta to conduct a study of juvenile polar bear movements to better understand natal dispersal and the extent to which bears born in or near Canada make use of U.S. terrestrial and offshore habitat at various life stages. A final report was expected in 2012 but had not yet been made available.
- *Bowhead Whale Feeding Variability in the Western Alaska Beaufort Sea*: The purpose of this study is to better understand the relationship

22 More information on projects funded in whole or in part by BOEM can be found on its website at http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Current-Research.aspx (accessed 30 September 2013). Websites for projects funded in whole or in part by other federal agencies are provided where available.

between environmental and behavioral variables on the timing and spatial extent of bowhead feeding in the western Alaska Beaufort Sea. It has been ongoing since 2005, funded by BOEM and conducted by NMFS's National Marine Mammal Laboratory. A final report is expected in 2013.

- *Pinniped Movements and Foraging in the Chukchi Sea—Bearded Seals and Walruses*: In 2007 BOEM and the National Marine Mammal Laboratory launched a study of bearded seal seasonal movements and behavior patterns in the Chukchi Sea lease sale area. Information on haul-out behavior and timing would be used in conjunction with survey data to develop abundance estimates. This study also is helping to identify key habitat in the Chukchi Sea. Preliminary results of tagged bearded seals indicate strong winter site fidelity (Boveng et al. 2012). A final report is expected in 2013. BOEM and the Alaska Department of Fish and Game launched a similar study of walrus habitat use in 2009; that study is ongoing. Both studies are being carried out in cooperation with Alaska Native communities.
- *Chukchi Offshore Monitoring in Drilling Area (COMIDA)*: BOEM initiated this study in 2008 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 migrating through the area. Based primarily on aerial surveys, the project was conducted by researchers from the National Marine Mammal Laboratory and a final report was published in 2011 (Clarke et al. 2011). A follow-on study focused on chemical and benthic processes and productivity in the drilling area was initiated in 2009 and a final report was published in 2012 (Dunton 2012).
- *Demography and Behavior of Polar Bears Summering on Shore in Alaska:* This project is providing information on the sub-population of polar bears that summer in the Beaufort and Chukchi Seas, and how they may be affected by increasing oil and gas activities. Initiated in 2009, it is being carried out by the U.S. Geological Survey (USGS) and FWS. A final report is expected in 2014.
- *Bowhead Whale Aerial Survey Program (BWASP)*: The MMS (later BOEM) and the National Marine Mammal Laboratory have conducted aerial surveys of bowhead whales in the Beaufort Sea during the fall migration each year since 1987. The project was extended in 2011 to provide additional data for environmental impact analyses of oil and gas activities in the Beaufort Sea. Summary reports are expected in 2013.
- *Synthesis of Arctic Research (SOAR):* In 2011 BOEM funded NOAA's Pacific Marine Environmental Laboratory to synthesize available information from previous and ongoing BOEM-funded research and related studies to better understand the relationships between ocean conditions, lower trophic level prey species, and marine mammal distribution and behavior in the Chukchi Sea lease area and adjacent waters. This work is expected to enhance scientific capability to predict future changes in ocean conditions.[23] Researchers will synthesize the range of BOEM-funded research in the region, including aerial surveys and passive acoustic monitoring of bowhead whales, walruses, and pinnipeds, as well as other ecosystem studies. The final report is expected in 2016.
- *Ice Seal Aerial Surveys in U.S. and Russian Waters*: In 2012 NMFS and BOEM collaborated with Russian researchers in a large-scale aerial survey of the Okhotsk and Bering Seas.[24] The survey results will be used to produce the first region-wide minimum estimates of abundance for four ice-associated seals—bearded, spotted, ringed, and ribbon seals. The first aerial survey was conducted in April and May 2012 and the second is planned for 2013. The surveys used advanced thermal-imaging technology to detect the warmth of the seals' bodies on and around the colder ice.

23 More information can be found at http://www.arctic.noaa.gov/soar/ (accessed 30 September 2013)

24 http://www.afsc.noaa.gov/Quarterly/amj2012/divrptsNMML2.htm (accessed 30 September 2013)

- *Cook Inlet Beluga Whale Stock Assessments*: NMFS conducted aerial surveys of beluga whales in Cook Inlet in 2012 as part of a long-standing research program.[25]

Atlantic:

- *Atlantic Marine Assessment Program for Protected Species (AMAPPS)*: Beginning in 2010, BOEM has provided funding on an annual basis to NMFS (for marine mammals and turtles) and FWS (for migratory birds) to conduct stock assessment surveys along the Atlantic coast of the United States and portions of Canada. The Navy has supplemented this annual funding since 2011. The program involves annual or seasonal aerial and ship-based surveys of marine mammals and other protected resources. BOEM and the Navy plan to use the resulting data to help evaluate and design measures to mitigate the impact of their activities, or those they oversee, on protected species. NMFS published a summary report of AMAPPS project activities to date in 2012 (NMFS 2012), and a final report for the five-year project is expected in 2015.

Gulf of Mexico:

- *Seismic Survey Mitigation Measures and Marine Mammal Observer Reports*: This BOEM-funded study involved a synthesis and summary of seismic survey observer reports submitted to BOEM by industry between December 2002 and December 2008. The final report, Seismic Survey Mitigation Measures and Marine Mammal Observer Reports, was published in June 2012 (Barkaszi et al. 2012). The authors reviewed 1,440 bi-weekly reports representing 194,273 hours of visual survey, 3,963 sightings records, and about 28,000 reports of individual animals, mostly cetaceans (85 percent). The most common whale species observed was the sperm whale, with 1,136 records, and the most common small cetacean species observed was the pantropical spotted dolphin, with 740 records. During the six years of observations there were 32 delays in ramp-ups recorded, with 75 percent due to dolphins, 12.5 percent due to sperm whales, and 12.5 percent due to sea turtles, resulting in a total of 18.5 hours of down-time (out of more than 194,273 hours of observed operations). Whales were visually detected in the exclusion zone 194 times, with 144 of those resulting in shutdowns (operators are not required to shut down when dolphins are observed in the exclusion zone). Observers reported a total of 125.7 hours of down-time due to shutdowns. There was roughly one shutdown due to sperm whale sightings for every 1,500 hours of operation. Limited behavioral observations indicated dolphins tend to move farther away from airguns as the source level increases from ramp-up to full power. Observers reported that both sperm whales and delphinids showed more surface activity when the seismic source was at full level as compared to silent times.
- *Sperm Whale Acoustic Prey Study (SWAPS)*: In 2009 BOEM funded a NMFS study on the species composition and biomass of the mid-water squid and small pelagic fish that constitute the forage base for sperm whales. After a pilot survey was conducted in 2009, a dedicated survey was conducted in early 2010 using both acoustic methods and mid-water trawl nets to collect prey information at the same time as collecting information on sperm whale distribution and abundance throughout the Gulf. That survey was conducted just prior to the *Deepwater Horizon* oil spill. Researchers are now using that information to assess pre-spill distribution and contaminant levels of sperm whale prey species. A final report is still pending.
- *Sperm Whales and Bottlenose Dolphins in the Gulf of Mexico:* In 2011 BOEM funded NMFS to conduct a study of sperm whales in areas less affected by human activities in the eastern Gulf and to collect information on genetic 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 to build understanding of marine resources in the Gulf and will also be used to assess the envi-

25 http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/research.htm#ci (accessed 30 September 2013)

ronmental impact of potential lease sales in the Eastern Planning Area of the Gulf. A final report is expected in 2014.

California:

- *Characterizing and Quantifying Sea Lion and Seal Use of Offshore Manmade Structures off California:* In 2012 BOEM funded the National Marine Mammal Laboratory to count sea lions and seals on all California OCS oil and gas platforms under a variety of environmental conditions and seasons and to document activity trends (Figure V-8). The information will be used to aid in decision-making regarding future decommissioning of platforms and to better anticipate potential interactions with future renewable energy facilities. NMFS completed its initial characterization of all 23 platforms in 2012 and has selected five platforms for more focused study in 2013. A final report is expected in 2014.

Figure V-8. California sea lions hauled out on an oil and gas platform off southern California. (Source: G. Sanders, BOEM)

Moving toward Energy Independence

As detailed in the Commission's 2010–2011 annual report, efforts to reduce the United States' dependence 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 risks to marine ecosystems. To reduce the overall risks to marine mammals and ecosystems from offshore oil and gas development, the Commission has long argued that the United States needs 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 renewable energy sources—especially 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 pose considerable risk to the environment and human health. Burning fossil fuels produces carbon dioxide and other greenhouse gases that contribute to climate change. Increased production of renewable energy can also bring our nation closer to its goal of energy security.

Renewable energy supplied approximately 17 percent of global energy consumption in 2010 (REN21 2012). This represents a doubling of global renewable energy capacity in the decade since 2000 (National Renewable Energy Laboratory 2012). China, the United States, and the European Union are leading the development of renewable energy capacity. In 2011 global capacity from wind power was 4.6 percent (a 10-fold increase from 0.5 percent in 2000) (National Renewable Energy Laboratory 2012).

Wind energy is one of the most promising new technologies to expand renewable energy capacity. In the United States, the Department of Energy (DOE) has identified target scenarios for wind energy development (54 gigawatts and 20 percent renewable energy from wind by 2030) (DOE 2008, 2011). How-

ever, the United States does not have an overall national renewable energy target. Instead, individual states are driving renewable energy development by establishing their own targets. By the end of 2012, 29 states plus the District of Columbia and Puerto Rico had established renewable energy standards; another eight states and two territories had renewable energy goals.[26] These states' renewable energy targets range from 10 to 40 percent, some with timeframes as soon as 2020, and others out to 2035. Overall, U.S. renewable energy sources contributed 12 percent of total domestic electricity generated in 2011, with the majority of that coming from hydropower sources (6.4 percent) (National Renewable Energy Laboratory 2012). Although energy production from hydropower is expected to remain relatively stable, non-hydropower renewable energy contributions to domestic electricity are expected to surpass those from hydropower by 2020, increasing from 4 percent in 2010 to 9 percent by 2035 (U.S. Energy Information Administration 2012).

In 2012 President Obama challenged Congress[27] to establish a national Clean Energy Standard to help meet the Administration's goal of generating 80 percent of the nation's electricity from clean energy sources by 2035. Clean energy includes renewable energy sources as well as non-renewable sources such as natural gas, clean coal, and nuclear power. Congress responded by introducing the Clean Energy Standard Act of 2012 (S. 2146)[28], a bill that would employ a market-based approach to encourage the development and use of a variety of electricity-generating technologies. Under the bill, generators of clean energy could use a mix of technologies and fuels and would be given credits based on their carbon emissions, with higher numbers of credits provided to energy generators with lower emissions per unit of electricity. As of the end of 2012, the bill had yet to pass.

A summary of other legislative and regulatory initiatives for renewable energy development since 2005 was provided in the Commission's 2010–2011 annual report.

Ocean Renewable Energy Sources, Potential Impacts, and Status of Development

Exploration and development of renewable energy sources in the ocean will require sound science and a commitment to protect the lives and health of people, wildlife, and our ocean and coastal habitats (Kennedy 2010). The Commission's main concerns with regard to offshore renewable energy (primarily wind and hydrokinetics using waves, tides, or currents) focus on potential interactions of marine mammals with geological and geophysical surveys to assess the suitability of sites for development, and the construction, operation, and decommissioning of these facilities in coastal and offshore waters.

Wind energy: Wind energy is a potentially large source of renewable energy from offshore waters. Offshore wind resources are more abundant, stronger, and more consistent than land-based wind resources.[29] Commercial offshore wind projects generally use horizontal-axis wind turbines with a fixed or floating structure supporting a tower with three large blades. The electricity produced from the rotation of the turbine is transmitted to land.

Offshore wind turbines tend to be larger and more stable than those used on land. Concerns over visual impacts are reduced or eliminated if they are sited far offshore. On the other hand, power companies require considerable new infrastructure to transmit electricity generated offshore to land. At the end of 2012 the United States had yet to generate any wind energy from offshore wind, despite considerable potential (Figure V-9). The world leaders in offshore wind energy development in 2011 were the United Kingdom, Denmark, China, Netherlands, Germany, and Belgium.[30]

26 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/, accessed 30 September 2013).

27 State of the Union address, 24 January 2012. http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address (accessed 30 September 2013)

28 http://www.energy.senate.gov/public/index.cfm/featured-items?ID=1cac9909-e86f-4486-89d5-a13a763ad6ee (accessed 30 September 2013)

29 http://www1.eere.energy.gov/wind/offshore_wind.html (accessed 30 September 2013)

30 http://www.gwec.net/global-figures/global-offshore/ (accessed 30 September 2013)

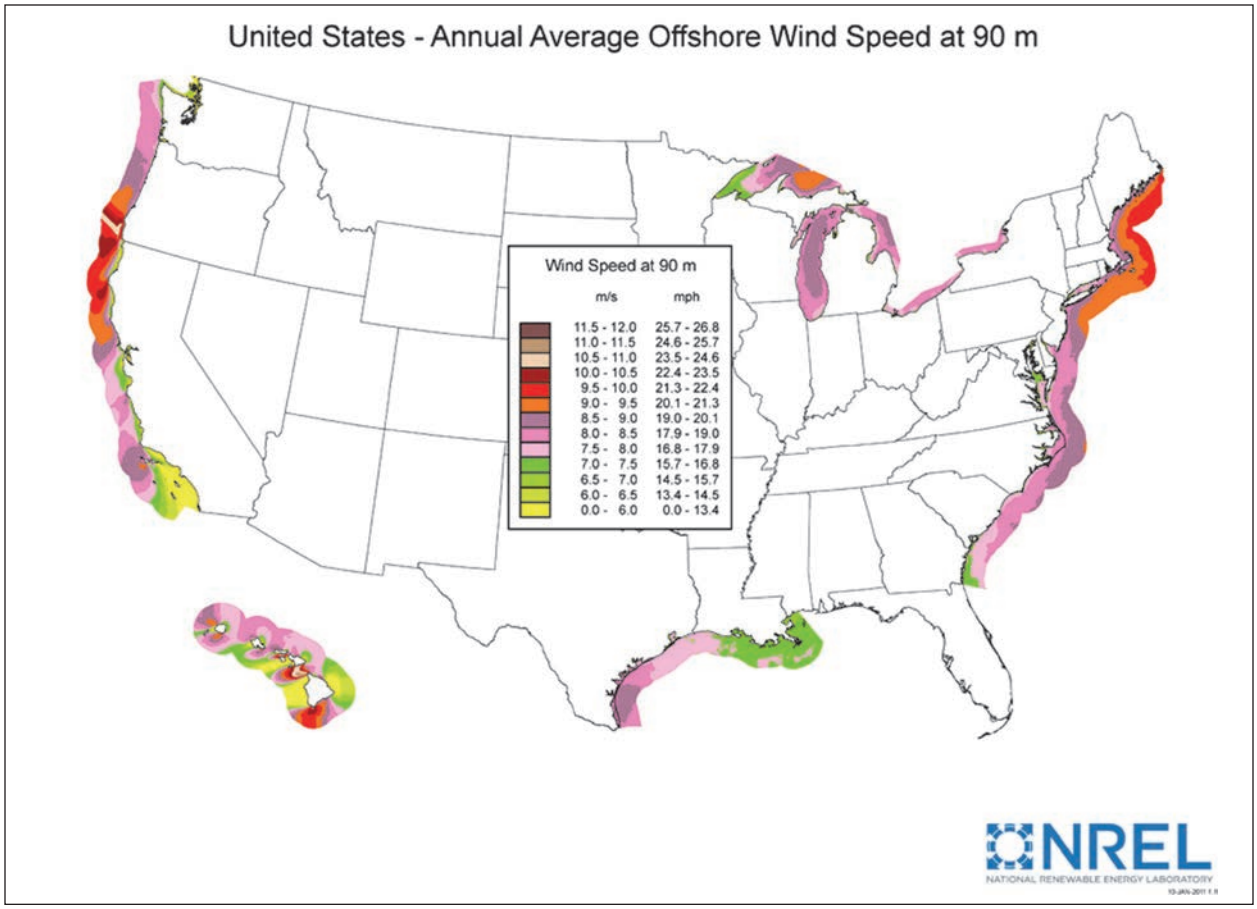

Figure V-9. U.S. offshore wind resources at 90 m above the surface. (Source: Schwartz et al. 2010)

Risks to marine mammals: Offshore wind is not without 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) and could impair hearing in marine mammals at close range (Madsen et al. 2006) and lead to changes in behavior at intermediate distances, including temporary or long-term displacement (Scheidat et al. 2011, Teilmann and Carstensen 2012). Sound generated from wind turbines would generally be of low intensity, with energy concentrated at low frequencies (below a few kHz), but when that sound is transmitted underwater around the wind farm it may contribute significantly to ocean sound levels almost continuously during the lifetime of the wind farm (Tougaard et al. 2008). Playback experiments involving harbor porpoises and harbor seals showed both species avoid the wind-turbine sounds; harbor porpoises also vocalized more frequently (Koschinski et al. 2003). Increased vessel activity associated with 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 strikes on marine mammals (Laist et al. 2001). Cables transmitting energy generated from wind turbines to land-based facilities generate electromagnetic energy, which has the potential to affect elasmobranchs (sharks and rays) and some bony fish species, marine mammals, sea turtles, and invertebrates (Normandeau et al. 2011). Pile driving, anchoring of wind platform structures, and laying of transmission cables

can temporarily or permanently disturb benthic habitat and prey species, and impact pile driving can kill certain species of fish. Apart from the potential impact on marine mammals, wind turbines can injure and kill birds and bats, and the construction of the turbines can disturb benthic habitat.

Mitigation measures to reduce the potential for harm from sound associated with site assessment activities are similar to those used for seismic surveys and include establishing site-specific exclusion and harassment zones, ramping up of 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 it closely enough to be injured, and prohibiting the use of the sound source during nighttime or low visibility conditions. Mitigation of potential harm from pile driving associated with meterological tower or wind turbine platform construction activities may include using "soft-start" procedures at the beginning of each pile installation (i.e., initiating pile driving at reduced power and frequency) and reducing pile-driving power or delaying pile driving if a marine mammal is sighted within the project's exclusion zone. Site assessment or pile driving activities also may be prohibited in sensitive areas at sensitive times. To minimize the risk of strikes by support vessels, they may be required to slow down in certain areas or within set distances from marine mammals. Monitoring and reporting measures for site assessment activities and pile driving would be similar to those required for oil and gas operations. Mitigation measures for operation and maintenance of wind farms have yet to be developed but will be a priority as projects move forward.

The federal leasing process: BOEM regulates leasing of wind energy sites on the outer continental shelf. BOEM 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. As described in detail in the Commission's 2010–2011 report, BOEM's leasing for commercial development of wind energy sites would occur in four general 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 (where necessary), and (4) approval of a construction and operation plan (which would include at least a conceptual plan for decommissioning).

Status of leasing activities: Under its 2007 interim policy for renewable energy development (73 Fed. Reg. 21152), in 2008 MMS (now BOEM) identified nine potential lease areas off the East Coast for potential limited leasing (five in New Jersey, one in Delaware, and three in Georgia). The leases would allow for data collection and technology testing activities in support of wind energy development. A year later MMS issued four limited leases—three in New Jersey and one in Delaware.[31] The leases had a five-year term. In 2012 two of the leases[32] were relinquished; the remaining two had yet to be acted upon. BOEM is considering a fifth lease for areas off Georgia, in response to an application received from Southern Company in 2011. BOEM issued a notice of intent to prepare an Environmental Assessment (EA) for this area in December 2012 (77 Fed. Reg. 74512), and the Commission was preparing comments at the end of 2012.

Off the East Coast and in other OCS areas, wind energy projects are in various stages of development (Table V-3). Cape Wind, to be located off Cape Cod, Massachusetts, was the first wind energy facility to be proposed for U.S. offshore waters, in 2001. However, developers experienced delays early in the planning and environmental review phase due to opposition to the project by local residents, fishermen, and Native Americans. In 2005 Congress shifted regulatory authority for offshore renewable energy from the Army Corps of Engineers to DOI, prompting further environmental reviews and associated delays. In October 2010 the Secretary of the Interior signed a 33-year lease with Cape Wind Associates and in April 2011 BOEM approved its construction and operation plan. Cape Wind was in the midst of geological and geotechnical (site assessment) surveys at the end of 2012, with construction of the wind turbines to start as early as 2013.

In other areas, offshore wind energy projects are following the planning process described above.

31 MMS 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.

32 Bluewater Wind Delaware LLC, and Bluewater Wind New Jersey Energy LLC

Table V-3. Status of U.S. wind energy development projects on the outer continental shelf, by state (Source: BOEM)

Activity	ME	MA	RI/MA[1]	NY	NJ	DE	MD	VA	NC	SC	GA	OR	HI
Interim policy lease(s)					November 2009[2]	November 2009[3]					April 2011[4]		
Regional task force established	September 2010	November 2009	November 2009	November 2010	November 2009	October 2009	April 2010	December 2009	January 2011	March 2012		March 2011	March 2012
Potential lease area identified by task force	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No		No	No
Unsolicited request	October 2011[5]		2010 (2), will not proceed; November 2011[6]	September 2011[7]	2010, will not proceed			2009 (2), will not proceed; Jun 2012[8]					
Request for interest/Request for competitive interest	August 2012[5]	December 2010; Mar 2011	May 2012[6]	Planned for 2013		Apr 2010; Jan 2011	November 2010	December 2012[8]					
Determination of no competitive interest	December 2012[5]		August 2012[6]			April 2011[9]							
Call for information & nominations		February 2012	August 2011		April 2011		February 2012	February 2012	December 2012				
Notice of intent to prepare an EA/EIS	August 2012[5]	February 2012	August 2011		February 2011[10]	February 2011[10]	February 2011[10]	February 2011[10]	December 2012				
Notice of availability of draft EA/EIS		November 2012	July 2012		July 2011[10]	July 2011[10]	July 2011[10]	July 2011[10]					
Notice of availability of final EA/EIS		April 2011[11]			February 2012[10]	February 2012[10]	February 2012[10]	February 2012[10]					
Leasing area identified		May 2012	February 2012										
Proposed sale notice			December 2012					December 2012					
Final sale notice													
Lease sale (auction)			Planned for 2013					Planned for 2013					
Lease issuance		October 2010[11]				October 2012[9]							

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

[2] Three leases were executed: Deepwater Wind LLC (New Jersey), Fishermen's Energy of New Jersey LLC, and Bluewater Wind New Jersey Energy LLC; the lease for Bluewater Wind was relinquished in October 2012

[3] Lease executed for Bluewater Wind Delaware LLC; that lease was relinquished in October 2012

[4] Southern Company application for interim policy lease for deployment of a meteorological tower and/or a buoy

[5] StatOil North America (StatOil NA) Hywind Maine application for deployment of a multi-turbine floating wind park

[6] Deepwater Wind Block Island LLC Transmission System (DW BITS) application for Right-of-Way grant for transmission system between Block Island and the RI coastline.

[7] New York Power Authority application for an offshore wind project

[8] Virginia Department of Mines, Minerals, and Energy application for research lease to install two meteorological towers

[9] Bluewater Wind Delaware, LLC was determined by BOEM to be the only qualified applicant to respond to the request for competitive interest and was subsequently issued a lease

[10] The notices included mid-Atlantic wind energy areas off four states: New Jersey, Delaware, Maryland, and Virginia

[11] Cape Wind Associates; the environmental review and lease issuance did not follow the same steps outlined for other wind energy area projects

To that end, 12 regional task forces have been established for interagency consultation on offshore renewable energy, primarily wind energy—Maine, Massachusetts, Joint Rhode Island/Massachusetts, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Oregon, and Hawaii. At the end of 2012 seven of those task forces had identified OCS areas suitable for commercial wind energy leasing.

BOEM published calls for information in 2012 for four offshore leasing areas—Maryland (77 Fed. Reg. 5522), Virginia (77 Fed. Reg. 5545), Massachusetts (77 Fed. Reg. 5820), and North Carolina (77 Fed. Reg. 74204). A notice of intent to prepare an environmental assessment (EA) on lease issuance was issued in conjunction with the Massachusetts call (77 Fed. Reg. 5830). BOEM released a draft EA for lease issuance and site assessment activities for the Rhode Island/Massachusetts area of mutual interest in July (77 Fed. Reg. 39508) and for Massachusetts in November (77 Fed. Reg. 66185). In commenting on the former, the Commission recommended that BOEM expand its proposed mitigation and monitoring measures to ensure that right whales and other marine mammals are protected throughout the leasing area and also prohibit high-resolution geophysical surveys and pile driving in the lease area when right whales are expected to be present (i.e., from 1 November to 30 April and during times when NMFS has implemented dynamic management area restrictions in or adjacent to the area). A more detailed summary of the Commission's comments can be found in Appendix A (letter dated 2 August 2012).

BOEM finalized its programmatic EA for wind energy areas off New Jersey, Delaware, Maryland, and Virginia in February 2012 (77 Fed. Reg. 5560). The Commission sent a letter to BOEM in March noting that BOEM had failed to respond in a meaningful way to recommendations made by the Commission in its 2011 letter on the draft EA and reiterated those previous comments.

BOEM acted on two unsolicited requests for commercial leasing in 2012. The first was a 2011 request from StatOil for a commercial wind energy lease off Maine. BOEM issued a notice of intent to prepare an EIS (77 Fed. Reg. 47876) and a request for interest (77 Fed. Reg. 47877) in August and a determination of no competitive interest in December (77 Fed. Reg. 75187). The second was a 2011 request for a right-of-way grant from Deepwater Wind for its proposed Block Island Transmission System. BOEM issued a request for competitive interest in May (77 Fed. Reg. 30551) and a determination of no competitive interest in August (77 Fed. Reg. 47092). The majority of activities and structures associated with the Block Island Transmission System will be in state waters; therefore, the U.S. Army Corps of Engineers will be the lead federal agency with BOEM as a consulting agency. BOEM received a third unsolicited request for commercial leasing from the New York Power Authority in September 2011; action on that request was still pending at the end of 2012.

BOEM received an unsolicited request for a research lease from the Virginia Department of Mines, Minerals, and Energy in June 2012 to install two meteorological towers. A request for competitive interest was issued in December (77 Fed. Reg. 75656).

In November 2012 BOEM signed a commercial lease with Bluewater Wind Delaware, LLC, for wind energy development in an area off Delaware—the first under its Smart-from-the-Start initiative. Lease sale notices were published in December for the Rhode Island/Massachusetts Area of Mutual Interest (77 Fed. Reg. 71612) and for Virginia (77 Fed. Reg. 71621); lease sales for both areas are planned for 2013.

To provide the "backbone" grid to connect several of the proposed wind farms off the U.S. mid-Atlantic, Atlantic Grid Holdings LLC submitted an unsolicited proposal to BOEM in 2011 for a right-of-way grant to construct a high-voltage direct-current underwater transmission system. Figure V-10 illustrates the proposed Atlantic Wind Connection and associated wind energy areas in the mid-Atlantic. Action on that proposal was pending at the end of 2012.

Wind energy development in state waters: Wind energy development in state waters is regulated by individual state agencies under state processes. State processes may include the establishment of task forces or other advisory bodies to assist in the iden-

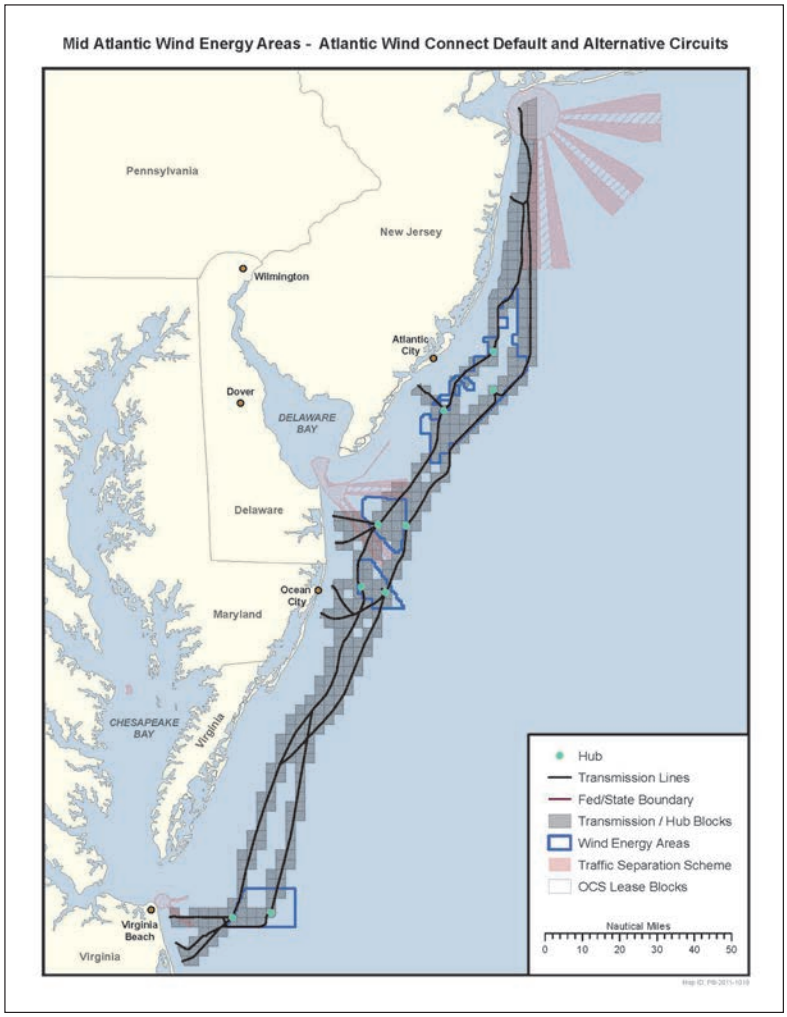

Figure V-10. Map of mid-Atlantic wind energy areas and the proposed Atlantic Wind Connection high-voltage direct-current transmission system. (Source: BOEM)

tification 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 four coastal states were moving forward with wind energy development projects in 2012. 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-megawatt wind farm on 12,350 leased acres at the Galveston Wind Project site. The Baryonyx Corporation has proposed a three-turbine, 18-megawatt wind farm to be installed off Padre Island, Texas. The University of Maine's Advanced Structures and Composites Center was constructing a floating platform wind turbine off the coast of Castine, Maine. It is a scaled-down version of a commercial turbine and is expected to be online in 2013. 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. It submitted an application to NMFS in February 2012 for an MMPA IHA for pile placement for the turbine foundation structures (77 Fed. Reg. 14736). The Commission provided comments on the IHA application in a letter dated 12 April 2012; see Appendix A for details regarding the proposed activities and Commission recommendations. The IHA was issued in July 2012 (77 Fed. Reg. 39999) and construction activities were authorized to start in summer 2013. Most of these state projects involve innovative designs and were funded in part by DOE as part of its Advanced Technology Demonstration Initiative.[33]

Hydrokinetic energy: Hydrokinetic energy is generated from the movement of water (e.g., tides, waves, and currents).[34] 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). Wave energy devices are generally installed at or near the ocean surface and convert energy from the up-and-down movement of waves into other energy types, usually

33 http://www1.eere.energy.gov/wind/offshore_wind.html (accessed 30 September 2013)

34 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.

electricity.[35] 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 on the seabed.

Worldwide, only a handful of hydrokinetic operations (most based on tidal energy) are generating reliable energy from the ocean (see the Commission's 2010–2011 annual report).

Risks to marine mammals: The potential impact of commercial-scale hydrokinetic energy projects on marine mammals and marine ecosystems is poorly known. Studies conducted around test facilities in the United Kingdom indicate a redistribution of harbor seals around tidal energy turbines but no change in abundance.[36] The impact during site assessment and construction is expected to be similar to that from wind energy, depending on the site characterization requirements and the design of the hydrokinetic device (DOE 2009). If the structure is to be mounted on the seafloor, bottom surveys would be needed to characterize subsurface structure, with a potential impact from sound generated by sub-bottom profilers. Pile driving may be required to mount permanent tidal or current turbine structures on the seafloor; this generates sound that could impair marine mammal hearing or affect behavior. Underwater turbine foils could injure marine mammals, depending on turbine design and the species in the area (DOE 2009, Wilson et al. 2007). The sound generated by underwater turbines may also disturb marine mammals.[37] Wave attenuators or over-topping devices to capture wave energy may present entanglement or entrapment hazards to marine mammals, but few studies are available to evaluate that risk. Again, as with wind energy, support activities associated with site characterization, construction, and maintenance of hydrokinetic energy devices bring the risk of vessel strikes, electromagnetic disturbance, habitat degradation, and impact on marine mammal prey species (DOE 2009), and mitigation measures would be similar to those discussed for wind energy projects. Measures to prevent interactions, including collisions with underwater turbines, could include deploying acoustic deterrent devices, increasing the underwater visibility of the structures, shielding the turbines, and/or reducing sharp edges (Wilson et al. 2007). Ideally, such projects would be sited away from areas inhabited by vulnerable populations or those having high marine mammal densities.

Leasing and licensing process: Leasing of hydrokinetic energy sites is regulated either by BOEM (for federal waters) or individual states (for state waters). BOEM follows the same process for leasing and limited leasing of hydrokinetic sites as described above for wind energy and as described in the Commission's 2010–2011 annual report. In 2012 BOEM and the Federal Energy Regulatory Commission (FERC) issued revised guidelines on regulation of marine and hydrokinetic energy projects on the OCS to clarify jurisdictional responsibilities for leasing and licensing of those projects.[38]

Status of leasing of hydrokinetic projects in offshore waters: In August 2011 Florida Atlantic University's Southeast National Marine Renewable Energy Center submitted an application to BOEM for an interim policy lease to test marine hydrokinetic turbines in the Florida Current offshore of Fort Lauderdale, Florida. The lease would authorize technology testing activities, including the installation, operation, relocation, and decommissioning of technology testing facilities. In April 2012 BOEM issued a notice of availability of an environmental assessment analyzing the environmental impact and socioeconomic effects of issuing the lease (77 Fed. Reg. 24734). The Commission provided comments to BOEM on the notice in a letter dated 25 May 2012, recommending that it revise the proposed lease and associated environmental assessment as necessary to (1) require the Renewable Energy Center to report all sightings, injuries, or deaths of marine mammals, (2) cease all activities involving an acoustic source, moving or operating turbines, or other mechanical equipment when the exclusion zone is obscured by poor visibility, and (3) deploy an underwater video

35 http://ocsenergy.anl.gov/guide/wave/index.cfm (accessed 30 September 2013)

36 http://mhk.pnnl.gov/wiki/index.php/Aquatic_Animal_Interaction_with_Marine_and_Hydrokinetic_Devices (accessed 30 September 2013)

37 http://mhk.pnnl.gov/wiki/index.php/December_14_2011_Webinar (accessed 30 September 2013)

38 http://www.boem.gov/BOEM-Newsroom/Press-Releases/2012/BOEM-FERC-staff-guidelines-pdf.aspx

camera, or system of cameras, to assess the nature and outcome of underwater interactions with marine mammals and other marine species. BOEM had yet to respond to comments or issue the lease at the end of 2012.

At the end of 2012 FERC had issued 11 preliminary permits for hydrokinetic projects in nearshore and offshore waters—10 for tidal energy and 1 for wave energy (Table V-4). Proponents of projects with preliminary permits were collecting information to support license applications. Three hydrokinetic projects had been licensed by the end of 2012—two pilot tidal projects and one commercial wave project. Three other tidal projects were pending (Table V-5).

In January 2012 NMFS published a proposed incidental harassment authorization for pile placement for the Ocean Renewable Power Company's Cobscook Bay tidal energy pilot project (77 Fed. Reg. 2701). The Commission provided comments to NMFS on the proposed authorization, recommending that NMFS include authorization for both in-air and in-water harassment of harbor seals and gray seals. The Commission also recommended enhanced monitoring of the harassment zone to determine the effectiveness of soft-start procedures. Additional details regarding the proposed activities and Commission recommendations are in Appendix A (see letter dated 21 February 2012). The IHA was issued on 14 March 2012 (77 Fed. Reg. 15045) with activities authorized to start immediately.

Table V-4. Hydrokinetic projects issued preliminary permits as of December 2012, by state (Source: FERC)

Project name	Developer	Location	Permit issued	Permit expires	Type of energy	Capacity (KW)
Alaska						
East Foreland Tidal Energy	Ocean Renewable Power Co. Alaska 2, LLC	Cook Inlet	11 Mar 2011	28 Feb 2014	Tidal	100,000
California						
San Onofre OWEG Electricity Farm	JD Products, LLC	Pacific Ocean (CA)	29 Oct 2010	30 Sep 2013	Wave	3,186,000
Maine						
Half Moon Tidal Energy	Tidewalker Associates	Passamaquoddy Bay	3 Dec 2010	30 Nov 2013	Tidal	9000
Pennamaquan Tidal Power Plant	Pennamaquan Tidal Power, LLC	Pennamaquan River	1 Mar 2011	28 Feb 2014	Tidal	21,100
Western Passage OCGen Power	Ocean Renewable Power Co. Maine, LLC	Atlantic Ocean (Maine)	13 Jan 2011	31 Dec 2013	Tidal	1200
Massachusetts						
Muskeget Channel Tidal Energy	Town of Edgartown, MA	Muskeget Channel	2 Aug 2011	31 Jul 2014	Tidal	4940
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
Alexandria Bay	Natural Currents Energy Services, LLC	St. Lawrence River	17 Dec 2012	30 Nov 2015	Tidal	5000
Fishers Island	Natural Currents Energy Services, LLC	Long Island Sound	5 Dec 2012	30 Nov 2015	Tidal	5000
Orient Point Tidal	Natural Currents Energy Services, LLC	Long Island Sound	17 May 2012	30 Apr 2015	Tidal	4940

Table V-5. Pending and issued licenses for hydrokinetic projects as of December 2012 (FERC)

Project name	Developer	Location	License issued	License type (duration)	Type of energy	Capacity (KW)
Reedsport OPT Wave Park	Ocean Reedsport OPT Wave Park, LLC	Pacific Ocean (OR)	13 Aug 2012	Commercial (35 years)	Wave	1,500
Roosevelt Island Tidal Energy Project	Verdant Power, LLC	East Channel of the East River, NY	23 Jan 2012	Pilot (10 years)	Tidal	1,050
Cobscook Bay Tidal	Ocean Renewable Power Co. Maine, LLC	Cobscook River, ME	27 Feb 2012	Pilot (8 years)	Tidal	300
Admiralty Inlet Pilot Tidal Project	Snohomish County Public Utility District	Admiralty Inlet, WA		Pending	Tidal	1000
New York East River Tidal	New York Tidal Energy Company	Hell Gate, East River, NY		Pending	Tidal	200
Muskeget Channel Tidal Energy	Town of Edgartown, MA	Muskeget Channel, MA		Pending	Tidal	4900

Baseline Information Requirements for Renewable Energy Development

At each stage of renewable energy development, BOEM (for wind energy) and FERC (for marine hydrokinetics) must conduct environmental reviews of proposed actions as required by NEPA.[39] Information is generally available regarding which stocks may be present in the project area, but for many stocks, baseline information on stock abundance or trends in abundance is not available. This type of baseline information, along with information on the responses of individual marine mammals to activities associated with renewable energy development, is needed for agencies to assess the potential environmental impacts of renewable energy development on marine mammal populations.

Research and environmental monitoring: BOEM plays an essential role in environmental research and monitoring of offshore renewable energy development. Its Environmental Studies Program has initiated baseline environmental studies in renewable energy leasing areas and, with DOE and NMFS, is supporting research into the effects of renewable energy development on marine mammals and the effectiveness of mitigation and monitoring measures. As noted in the previous section, BOEM and the Navy are collaborating with NMFS to conduct stock assessment surveys for marine mammals as part of the Atlantic Marine Assessment Program for Protected Species (AMAPPS). In addition, NMFS finalized its contract with BOEM to conduct a marine mammal and sea turtle data search and literature synthesis including stranding and nesting sites on the Atlantic coast (Waring et al. 2012b).[40] BOEM also received a final report from the University of Rhode Island on environmental protocols and modeling tools to support ocean renewable energy and stewardship (McCann 2012).

Commission staff attended a workshop convened by DOE in July 2012 to establish communication and coordination among researchers conducting marine wildlife surveys in the U.S. mid-Atlantic. Workshop participants discussed databases and data portals that contain biological data for waters of the mid-Atlantic region and modeling efforts underway to predict "hot spots" or geographic areas where certain species aggregate. They also shared track lines and metadata from recently completed and ongoing surveys to increase coordination, help ensure flight

39 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.

40 http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Renewable-Energy/Renewable-Energy.aspx

safety, and identify coverage gaps. A final report of the workshop is expected in 2013.

Off California, BOEM funded USGS researchers in 2010 to conduct monthly aerial surveys for seabirds and marine mammals.[41] The surveys will be used to inform future renewable energy planning in the Washington, Oregon, and California OCS planning areas. Aerial surveys were completed in 2012, and the project was expanded to include additional publications using previously existing USGS datasets. A final report and the additional publications are expected in 2015.

Industry requirements for submittal of environmental information. Renewable energy developers must provide specific environmental information to BOEM as part of the requirements for site assessment and construction and operation plans (30 C.F.R. Part 585 Subpart F). Industry needs appropriate guidelines to help direct the collection of that information and ensure that is sufficient for BOEM to conduct its required environmental reviews. In 2012 BOEM issued revised guidelines for shallow-hazard surveys, geological surveys, geotechnical surveys, and archaeological resource surveys required for development of wind energy resources;[42] however, it has yet to issue guidelines for required biological surveys. The Commission provided comments to BOEM on its draft guidelines for protected species (marine mammals and sea turtles) and fish surveys in October 2012; BOEM has indicated that final guidelines will be available in 2013.

The *Deepwater Horizon* Oil Spill

On 20 April 2010 BP's mobile offshore drilling unit *Deepwater Horizon* exploded, burned, and subsequently sank in the Gulf of Mexico 52 miles southeast of Venice, Louisiana. 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[43]) of oil spilled into the Gulf (NOAA 2010, Federal Interagency Solutions Group 2010). This was the largest oil spill ever reported in U.S. history. In comparison, the *Exxon Valdez* tanker spilled approximately 11 million gallons (257,000 barrels) of crude oil into Prince William Sound, Alaska, in 1989.[44]

The Commission's 2010–2011 annual report summarized in detail events related to the *Deepwater Horizon* oil spill. It included a summary of response and containment efforts, preliminary investigations into the causes of the spill, the response to injured and oiled marine mammals (mostly cetaceans) and sea turtles, and the potential effects of oil exposure on marine mammals and the Gulf ecosystem. It also described the Natural Resource Damage Assessment (NRDA) process under the Oil Pollution Act of 1990, damage assessment activities initiated after the spill, and factors confounding efforts to assess oil spill-related injuries to marine mammals, including the ongoing bottlenose dolphin unusual mortality in the northern Gulf. The report discussed how the lack of baseline information on Gulf marine mammals would likely hinder a comprehensive assessment of injuries and the need for long-term monitoring to fully assess oil spill-related impacts and track the effectiveness of restoration efforts.

The 2010–2011 annual report also summarized the Commission's "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," which outlined the legal mandates for assessing the spill's overall effects and reviewed the likely impact of the spill on Gulf marine mammals. It characterized research efforts to date, highlighted the overall need to improve assessment and monitoring of marine mammals in the Gulf, and outlined priorities for future research and restoration efforts, stressing the importance of long-term monitoring studies on both individuals and populations.

The following sections address activities that occurred in 2012 in association with the *Deepwater Horizon* oil spill. These include injury assessment and restoration planning activities, which in 2012 were driven largely by the NRDA process. Planning activities included efforts to identify and implement early restoration projects under the 2011 Framework

41 http://soundwaves.usgs.gov/2012/04/ (accessed 30 September 2013)

42 http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/GGARCH.aspx (accessed 30 September 2013)

43 One barrel of oil equals 42 U.S. gallons.

44 http://www.arlis.org/docs/vol2/a/EVOS_FAQs.pdf (accessed 30 September 2013)

Agreement between BP and the NRDA Trustees.[45] Also included is a summary of the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act of 2012, which has the potential to increase significantly efforts to restore the Gulf ecosystem and recover marine mammal populations injured as a result of the spill. Included in the following section are the Commission's priorities for restoration planning for marine mammals in the Gulf.

The Natural Resource Damage Assessment process

The Oil Pollution Act requires federal, state, and tribal Natural Resource Damage Trustees to conduct scientific and economic studies following an oil spill to quantify injuries to natural resources and the loss of public use of those resources. This process is known as the natural resource damage assessment, or NRDA. The Trustees then determine the restoration actions needed to bring injured natural resources and the services they provide back to baseline conditions and make the environment and the public "whole" with regard to spill-related losses (15 C.F.R. § 990.30).

Natural resources include wildlife, such as marine mammals, sea turtles, seabirds, fish, and invertebrates (e.g., coral, shrimp), and their habitat. Natural resource services include the functions of and benefits derived from those natural resources, such as tourism, fishing, boating, marine products, and transportation. The responsible parties (i.e., those entities responsible for damages resulting from the incident) are required to pay the costs of natural resource damages (including the costs of assessing such damage) and compensate the public for lost services derived from natural resources, subject to statutory limitations.[46]

NOAA regulations implementing the Oil Pollution Act[47] specify three phases for conducting damage assessments: (1) pre-assessment, (2) injury assessment and restoration planning, and (3) restoration implementation (Figure V-11). 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 Oil Pollution 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

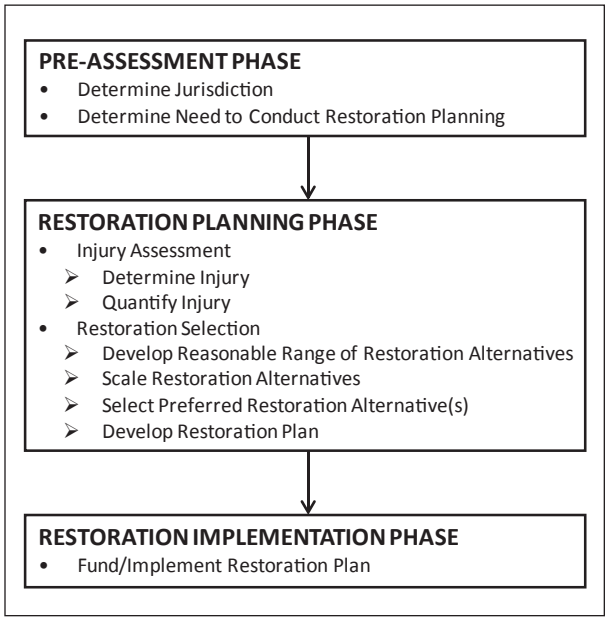

Figure V-11. Phases involved in a natural resource damage assessment under the Oil Pollution Act of 1990. (Source: NOAA)

45 Natural Resource Damage 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. Natural Resource Damage Trustees designated for the *Deepwater Horizon* incident include the Department of Commerce (NOAA), the Department of the Interior (FWS, National Park Service, and the Bureau of Land Management), the Department of Defense, the Environmental Protection Agency,* the Department of Agriculture,* and state agencies from the five affected coastal states (Florida Department of Environmental Protection and Fish and Wildlife Conservation Commission; Alabama Department of Conservation and Natural Resources and Geological Survey of Alabama; Mississippi Department of Environmental Quality; Louisiana Coastal Protection and Restoration Authority, Oil Spill Coordinator's Office, Department of Environmental Quality, Department of Wildlife and Fisheries, and Department of Natural Resources; and Texas Parks and Wildlife Department, General Land Office, and Commission on Environmental Quality) (75 Fed. Reg. 60800; *added by Executive Order 13626 on 10 September 2012).

46 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).

47 15 C.F.R. § 990.10-990.66

coastal resources, and making a preliminary determination regarding the extent and severity of injury. NOAA, FWS, and the other federal and state Trustees initiated the pre-assessment phase of the NRDA concurrent with initial response activities to the Deepwater Horizon oil spill.

As part of the pre-assessment, 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 both biological and economic injuries caused by the spill and develop a plan for restoring the environment to remedy those injuries. Regulations require the Trustees to invite the responsible party or parties to participate in the natural resource damage assessment[48] in a process known as "cooperative assessment." Cooperation between the Trustees and the responsible party can create cost and time efficiencies in data collection, allow concerns to be raised early in the assessment process, and expedite restoration, thereby benefiting the environment and stakeholders by minimizing interim lost services (West Coast Joint Assessment Team 2007, NOAA 2012b). However, decisions on the scope of cooperation with the responsible parties are solely the responsibility of the Trustees.

Trustees are required to provide the public with an opportunity to comment on proposed restoration plans. Once the Trustees 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 of a NRDA can take months to years, depending on the size and extent of the spill and other factors.

Activities to Assess Injuries to Marine Mammals

In October 2010 the state and federal Trustees for the *Deepwater Horizon* oil spillconfirmed damage and injury to Gulf natural resources in state and federal waters as a result of the spill (75 Fed. Reg. 60800). That determination initiated the injury assessment and restoration planning phase of the process.

In general, injury assessments begin with quantifying the impact on either a specific type of resource (e.g., marine mammals) or habitat (e.g., deepwater). Each assessment is led by a designated technical working group composed of subject-matter experts and scientists from state and federal resource agencies, universities, and other institutions. Each technical working group develops work plans to guide the damage assessment process and direct data collection efforts.

Injury assessments conducted by the technical working groups for the *Deepwater Horizon* oil spill largely have been conducted cooperatively with BP, the primary responsible party for the spill. BP's involvement in the review of work plans expedited its upfront funding for the costs associated with data collection. Cooperative assessments generally do not extend to the analyses of such data, which the responsible party and the Trustees conduct independently of one another. All work plans and some of the preliminary data for the *Deepwater Horizon* injury assessments have been made available by the Trustees on a publicly accessible website.[49]

Marine mammal injury assessments for the *Deepwater Horizon* were conducted by the Trustees' Marine Mammal Technical Working Group, in cooperation with BP. The assessments conducted in 2012 were largely a continuation of studies initiated immediately after the spill, but with additional emphasis on investigations of the ongoing mortality of coastal and estuarine bottlenose dolphins, specifically their movements, habitat use, reproductive rates, and the sub-lethal effects of oil exposure. Efforts were initiated also to integrate data collected on marine mammals with other spill-related data sets.

Injury assessment studies conducted on marine mammals in 2012 included:

- **Aerial surveys**: Aerial line-transect surveys were conducted to collect data on the seasonal abundance and spatial distribution of marine mammals and sea turtles on the continental shelf in the northern Gulf and near the shelf break in

48 15 C.F.R. § 990.14(c)

49 http://www.gulfspillrestoration.noaa.gov/oil-spill/gulf-spill-data/ (accessed 30 September 2013)

the north-central Gulf and to track changes in abundance and shifts in spatial distribution relative to baseline (pre-spill) conditions.

- **Tracking studies**: Photographic monitoring and tracking of individual bottlenose dolphins with satellite-linked and VHF radio tags (applied during the 2011 Barataria Bay health assessments; see the Commission's 2010–2012 annual report for more details) were conducted in the spring of 2012 to document the external appearance of tagged dolphins and monitor them for any indication of health problems. In addition, boat-based surveys were conducted in the summer in Barataria Bay and Mississippi Sound to monitor pregnant dolphins identified during the 2011 Barataria Bay health assessments and other previously biopsied animals. Data will be used to assess movements, range, and preferred habitat.
- **Tissue sampling and analyses**: Bottlenose dolphin biopsy samples were collected in the winter/spring of 2012 during the peak calving period in Mississippi Sound and Barataria Bay. Those samples, along with samples collected from sperm whales and bottlenose dolphins in 2010 and 2011, were analyzed to determine sex and genetic relatedness among groups and were also subject to a suite of diagnostic assessments to better understand observed disease conditions, to identify biomarkers such as cytochrome P4501A (CYP1A) that might indicate exposure to oil or other contaminants, and to identify any associated secondary effects of disease or contaminant exposure on health.
- **Satellite tag analyses**: Location and other data collected from sperm whales satellite-tagged in 2010 and 2011 were analyzed for insight on core use areas, home ranges, and site fidelity. Habitat data (water depth, sea surface temperature, chlorophyll, and sea surface height) were also analyzed to help characterize sperm whale home ranges and core use areas.
- **Passive acoustic monitoring**: Autonomous recording units previously deployed to detect the presence of vocalizing marine mammals were retrieved and redeployed in the northern Gulf.
- **Prey sampling**: Small pelagic fish and other organisms were sampled from inshore and nearshore waters of Louisiana using trawl and gillnet gear. Data were used to assess distribution and abundance.

In addition, tissue samples from stranded animals were collected throughout the year by members of the Gulf marine mammal stranding network and provided to NMFS as part of the NRDA process.

Potential Effects of Oil Exposure and Oil Spill Response Activities on Marine Mammals

Current understanding of the potential effects of oil on marine mammals is based on limited information from previous studies or spill events and studies of similar species (as summarized with appropriate references in the Commission's 2010–2011 annual report). In general, there are three main pathways for direct exposure to oil or other contaminants: (1) inhalation, (2) ingestion, and (3) contact through the skin, eyes, or mucous membranes. 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 an inability to digest food. 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. Significant acute or chronic exposure could affect an individual's ability to survive and reproduce and, consequently, the survival and reproductive rates of the affected population.

In addition to direct exposure to oil and other contaminants, marine mammals may also experience disturbance from oil spill response activities. Increased vessel and air traffic may disrupt foraging, habitat use, daily or migratory movements, and behavior, and may also increase the risk of vessel

strikes. Response activities, such as the use of booms and skimmers to contain and collect surface oil, may affect marine mammals both through direct interaction and displacement from habitat. Oil spills also may affect marine mammals by altering the marine ecosystem and key features of their habitat, resulting in changes in habitat quality or prey availability.

Preliminary Information regarding Injuries to Gulf Marine Mammals from the *Deepwater Horizon* Oil Spill

Twenty-two marine mammal species reside in or regularly visit the inshore, coastal, and offshore waters of the Gulf of Mexico (Table V-6). They comprise 58 stocks, 37 of which are bottlenose dolphin stocks. Several of those stocks may have been, and may continue to be, directly or indirectly affected by the *Deepwater Horizon* spill. Because the injury assessment was still ongoing in 2012, the scope and significance of lethal and sub-lethal injuries to Gulf marine mammals as a result of the oil spill had yet to be fully determined.

Preliminary injury assessments conducted through 2012 documented both lethal and sub-lethal effects on individual marine mammals in the Gulf. Assessments have also indicated injuries at the population level that may decrease reproduction and survival rates of certain stocks over time. Specific observations include higher-than-average levels of mortality of several species (primarily bottlenose dolphins), decreased reproductive success, and an

Table V-6. Marine mammal species and stocks in the Gulf of Mexico (Source: Waring et al. 2012a)

Common name	Stock	Species name
Atlantic spotted dolphin	Continental shelf	*Stenella frontalis*
Blainville's beaked whale	Oceanic	*Mesoplodon densirostris*
Bryde's whale	Oceanic	*Balaenoptera edeni*
Clymene dolphin	Oceanic	*Stenella clymene*
Common bottlenose dolphin	Bay, sound, estuary (32 stocks)	*Tursiops truncatus*
Common bottlenose dolphin	Coastal (3 stocks)	*Tursiops truncatus*
Common bottlenose dolphin	Continental shelf	*Tursiops truncatus*
Common bottlenose dolphin	Oceanic	*Tursiops truncatus*
Cuvier's beaked whale	Oceanic	*Ziphius cavirostris*
Dwarf sperm whale	Oceanic	*Kogia sima*
False killer whale	Oceanic	*Pseudorca crassidens*
Fraser's dolphin	Oceanic	*Lagenodelphis hosei*
Gervais' beaked whale	Oceanic	*Mesoplodon europaeus*
Killer whale	Oceanic	*Orcinus orca*
Melon-headed whale	Oceanic	*Peponocephala electra*
Pantropical spotted dolphin	Oceanic	*Stenella attenuata*
Pilot whale, short-finned	Oceanic	*Globicephala macrorhynchus*
Pygmy killer whale	Oceanic	*Feresa attenuata*
Pygmy sperm whale	Oceanic	*Kogia breviceps*
Risso's dolphin	Oceanic	*Grampus griseus*
Rough-toothed dolphin	Continental shelf and oceanic	*Steno bredanensis*
Sperm whale[1]	Oceanic	*Physeter macrocephalus*
Spinner dolphin	Oceanic	*Stenella longirostris*
Striped dolphin	Oceanic	*Stenella coeruleoalba*
West Indian manatee[1]	Coastal	*Trichechus manatus*

[1] Listed as endangered under the Endangered Species Act (ESA)

increased incidence of health issues consistent with the known toxic effects of experimental oil exposure (NOAA 2012b).

During the initial response phase of the spill (30 April through 2 November 2010), 122 cetaceans stranded or were reported dead in the northern Gulf. This represented a significant increase in the mean monthly stranding rate as compared to 2002–2009.[50] However, it is not yet clear whether the deaths were directly related to the oil spill or whether other factors contributed to the increased rate.

In February 2010 just prior to the spill, an unusually high number of bottlenose dolphins began to strand in the northern Gulf. NMFS consulted immediately with the Working Group on Marine Mammal Unusual Mortality Events (UME Working Group) to determine whether this pulse in strandings constituted an unusual mortality event (in accordance with section 404 of the MMPA), but the consultation was delayed when the spill occurred as NMFS turned its attention to oil spill response efforts. Consultation with the UME Working Group was reinitiated in October 2010 and, in December of that year, NMFS declared the deaths to represent an unusual mortality event. Since then, and through 2012, strandings continued to be elevated in the northern Gulf. Strandings in Mississippi and Alabama, in particular, included a large percentage of premature, stillborn, and neonatal bottlenose dolphins during February and March, when dolphins typically calve.

To the extent practicable where the data and analytical needs of the NRDA and UME processes coincide, NOAA and the UME Working Group are coordinating the investigation of the strandings (pre-, during, and post-oil spill) with ongoing oil spill injury assessment activities. At the end of 2012 the unusual mortality event and the investigation were still ongoing, with a total of 826 stranded dolphins reported thus far (Figure V-12). The UME Working Group has yet to determine the cause or causes of the unusual mortality event, but 13 of the 58 stranded bottlenose dolphins that had been examined by the end of 2012 tested positive for the bacterium *Brucella*.[51] *Brucella* infections in Gulf of Mexico dolphins are not new and whether *Brucella* is playing a role in the unusual mortality event is currently unknown.

In general, the injuries and deaths of marine mammals that are observed and reported as stranded represent only a fraction of the numbers that actually occur. For example, Williams et al. (2011) estimated that only 2 percent of the carcasses of animals that stranded in the Gulf immediately after the oil spill were likely recovered. Therefore, if the strandings were in some way connected to the oil spill, the reported damage may be underestimated. Besides the species and stocks represented in the stranding records, other species and stocks of marine mammals that occur in the same region may also have been injured but not recovered. In any event, the reported marine mammal strandings should be considered only minimal estimates of actual injuries and deaths.

With respect to oceanic species, preliminary results from tagging studies indicated that sperm whales with home ranges near the spill site stayed in that general region but avoided the most heavily surface-oiled areas (Mate 2011). Analyses of ceta-

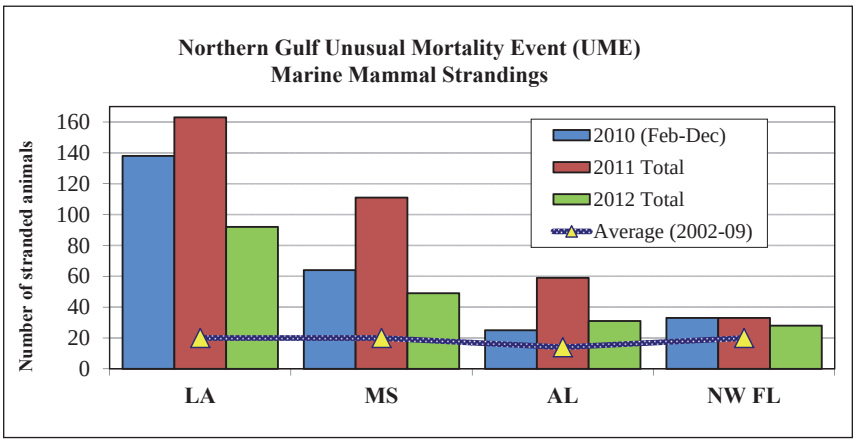

Figure V-12. Number of marine mammals known to have stranded in the northern Gulf of Mexico from Franklin County, Florida, to the Texas/Louisiana border, both before the *Deepwater Horizon* oil spill (based on average reported strandings per calendar year) and after (by year). (Source: NOAA)

50 http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico2010.htm (accessed 30 September 2013)

51 http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico2010_brucella.htm (accessed 30 September 2013)

cean vocalizations recorded by passive acoustic monitoring buoys deployed around the Gulf by researchers at Cornell University and the Scripps Institution of Oceanography had yet to be released.

Researchers from the U.S. Geological Survey continue to analyze data from aerial surveys and tagging studies to assess abundance and distribution of manatees in the affected area before, during, and after the spill and to gain a better understanding of habitat use.

An update on the full suite of damage assessments being conducted by NOAA and the other Trustees was made available in 2012 (NOAA 2012b). That update summarized previous, ongoing, and planned activities to assess injury to the Gulf of Mexico ecosystem and the lost human use of natural resources caused by the oil spill and associated response actions.

Information on the effects of the oil spill is also being collected by scientists that are independent of the NRDA process. Support for such research has come from BP, other federal agencies that are not part of the NRDA process, and private foundations. A summary of independent research on marine mammals funded immediately after the spill was provided in the Commission's 2010–2011 annual report.

BP was a significant source of oil spill-related research funding in the Gulf. In May 2010 BP committed $500 million over a 10-year period to investigate the impact of the spill on the Gulf ecosystem and affected states. In 2010, the first year of the program, BP provided $45 million in funds directly to four Gulf research institutions and the National Institutes of Health to collect data on the health of oil spill workers and volunteers. A wide variety of studies were implemented, including a study by the Florida Institute of Technology on the effects of oil on estuarine bottlenose dolphins in the Florida panhandle (final results of this study were pending at the end of 2012).

In subsequent years, BP funds were awarded both to research consortia and independent researchers through the Gulf of Mexico Research Initiative (GOMRI). The initiative is overseen by an independent board of scientists selected by BP and the governors of the five Gulf states. The objective of this competitive program 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."[52]

In 2011 GOMRI awarded $1.5 million in partial-year grants to continue work initiated in 2010. It also awarded $112 million in three-year grants to fund new and established research consortia studying the fate of petroleum in the environment, the impact of the spill, and the development of new tools and technologies for responding to future spills and improving mitigation and restoration efforts. Scripps Institution of Oceanography received funds to continue studies on the impact of the oil spill on marine mammal distribution, as determined by vocalizations, as well as on the toxic impact of the spill, as part of the Center for Integrated Modeling and Analysis of Gulf Ecosystems (C-IMAGE). In August 2012 GOMRI awarded nearly $19 million in three-year grants to 19 individual researchers to fill gaps in previously awarded studies; none of these grants were specifically directed at research on marine mammals.

Some of the results of independent research and analyses regarding the effects of the *Deepwater Horizon* oil spill on marine mammals began to become available in 2012. For example, Ackleh et al. (2012) recorded sperm whale vocalizations at three sites in the northern Gulf before and after the spill—first for 8 days in July 2007 and again for 12 days in September 2010. Acoustic activity and estimated abundance were analyzed for two of the sites, one 14.5 km (9 miles) and the other 40 km (25 miles) from the spill site. There was a decrease in acoustic activity and the number of whales at the nearer site in 2010 as compared to data collected there in 2007, and an increase in activity at the farther site, possibly indicating avoidance of areas around the spill site. In another study, Carmichael et al. (2012) postulated that an influx of cold freshwater from the Mississippi River in the winter of 2011, combined with the poor health status of dolphins as a result of the oil spill, contributed to the elevated numbers of near-term and

52 http://gulfresearchinitiative.org/ (accessed 30 September 2013)

neonatal bottlenose dolphin deaths observed in the northern Gulf during the 2011 dolphin calving season.

Marine Mammal Injury Assessments Planned for 2013

Additional information regarding injuries documented to date and planned activities for 2013 was made available by NOAA in a partial claim to BP for assessment and restoration planning costs (NOAA 2012c). In that document, NOAA highlighted marine mammal stocks and habitats that continue to be the focus of injury assessments: (1) multiple bottlenose dolphin stocks in Gulf bays, sounds, and estuaries; (2) delphinids in coastal areas out to the 200m isobath (including coastal and shelf stocks of bottlenose dolphins, Atlantic spotted dolphins, and rough-toothed dolphins); and (3) delphinids, Bryde's whales, and sperm whales in oceanic areas (beyond 200m depth).

To assess further injuries to coastal and estuarine dolphins, NOAA has proposed to conduct studies in 2013 focusing on sub-lethal effects of the oil spill and the cause or causes of observed mortality and reproductive failure. Specific studies will include live capture-release health assessments in Barataria Bay and Sarasota Bay (the two areas studied in 2011) as well as Mississippi Sound (another area exposed to oil during the spill); cell line studies to determine the relationship between oil exposure and adrenal organ function; a continuation of dolphin surveys in Barataria Bay and nearby waters (photo-identification and remote biopsy sampling); genetic analyses of new tissue samples to investigate stock structure; analysis of skin/blubber to assess CYP1A, genomics, stable isotopes, and quantification of persistent organochlorine pollutants (which may also influence CYP1A measures); and statistical and geospatial analyses of tissue samples from marine mammals and prey species to evaluate oil exposure. Researchers plan to continue analyses comparing the distribution of coastal and shelf animals in 2010–2012 aerial surveys with maps of surface-oiled areas to estimate numbers of marine mammals exposed to oil and to identify any detectable changes in abundance since the spill (noting that pre-spill abundance information is lacking for most marine mammal stocks). NOAA plans to continue its support of the Gulf stranding network members to ensure samples continue to be collected from stranded animals for NRDA analyses. NMFS will also support database management to track samples collected and analyses conducted. In an effort to better estimate total mortality, researchers will use advanced ocean circulation and oil transport models to develop a multiplier to apply to reported strandings that reflects the likelihood of dead animals not stranding or being otherwise undetected.

Although preliminary evidence suggested that sperm whale habitat use had been affected by the spill (Mate 2011), NOAA did not propose any additional fieldwork for oceanic species in its 2013 partial claim to BP for assessment and restoration planning costs. Assessments may still go forward if independent researchers can secure adequate funding for specific projects (e.g., sperm whale tagging). However, for all stocks of marine mammals, NOAA will conduct an integrated assessment starting in 2013 of all information available through the NRDA process to develop a more comprehensive assessment of injury.

Early Restoration Activities under NRDA

On 20 April 2011, the one-year anniversary of the *Deepwater Horizon* explosion, the Trustees and BP entered into a Framework Agreement for Early Restoration Addressing Injuries Resulting from the *Deepwater Horizon* Oil Spill (Framework Agreement) directing 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." The framework agreement set out the criteria for project design and selection and a system whereby benefits accrued by the projects would "offset" the assessed total injury resulting from the spill.[53]

The agreement required BP to set aside $1 billion for early restoration projects and outlined how the funds would be used. Each Gulf state would select and implement $100 million in projects, the federal Trustee agencies (NOAA and DOI) would each select

53 http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/2011/05/framework-for-early-restoration-04212011.pdf (accessed 30 September 2013)

and implement $100 million in projects, and the remaining $300 million would be used for projects selected by the two agencies from proposals submitted by the states.

In December 2011 the Trustees announced eight Phase I early restoration projects—two each in Louisiana, Mississippi, Alabama, and Florida—that met the framework criteria (76 Fed. Reg. 78016). The proposed projects were selected, in part, because they were "shovel-ready" (i.e., could be implemented quickly) and could soon 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. In April 2012 approval of those projects was announced (77 Fed. Reg. 23741) and a final environmental assessment and early restoration plan were published.

Public comments on Phase I requested that the Trustees include additional habitat and wildlife-based projects. In response, the Trustees announced two additional Phase II early restoration projects in November 2012 (77 Fed. Reg. 66626). Those projects addressed injuries to beach-nesting bird and loggerhead sea turtle nesting habitat in Florida, Alabama, and Mississippi that resulted from oil spill response and clean-up activities, at a cost of $17 million. The Phase I and II proposed projects are only the early stages of a multi-year process in which other projects will be proposed. The Trustees have stated that they would monitor implementation of the projects and adapt them as necessary.

Use of the Clean Water Act and Other Penalties for Restoration

Under the Oil Pollution Act, BP and the other parties responsible for the *Deepwater Horizon* oil spill are liable for costs associated with the removal of oil (i.e., clean-up costs) and for damages to natural resources and services caused by the spill, including the costs of assessing those damages. 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 in the Oil Spill Liability Trust Fund to be used for future oil spill clean-up 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.[54] Criminal penalties under the Clean Water Act could add another $2 to $4 million dollars to that estimate.[55]

In September 2010 Secretary of the Navy Ray Mabus recommended that a portion of the Clean Water Act civil penalties be used for restoration and economic recovery of the Gulf.[56] That recommendation was echoed by the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (Oil Spill Commission) in its January 2011 report to the President, Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling (Oil Spill Commission 2011). Congressional legislation to implement that recommendation in various forms was introduced in 2011 and 2012 in both the House[57] and the Senate[58] and was ultimately addressed in the RESTORE Act.

54 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.

55 If criminal penalties were 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.

56 http://www.restorethegulf.gov/sites/default/files/documents/pdf/gulf-recovery-sep-2010.pdf (accessed 30 September 2013)

57 H.R. 56 (Scalise, January 2011); H.R. 480 (Castor, January 2011); H.R. 501 (Markey, January 2011); H.R. 1333 (Miller, April 2011); H.R. 1762 (Bonner, May 2011); H.R. 1870 (Connolly, May 2011); H.R. 3096 (Scalise, October 2011); H.R. 4348 (Mica, April 2012)

58 S. 861 (Landrieu, April 2011); S. 862 (Nelson, April 2011); S. 1140 (Rockefeller, May 2011); S. 1400 (Landrieu, July 2011); S. 1813 (Boxer, November 2011)

The RESTORE Act: In June 2012, with bipartisan support, Congress passed the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act of 2012 as an amendment to a larger transportation bill. President Obama signed it into law on 6 July 2012.[59] The RESTORE Act of 2012 directed the Secretary of the Treasury to deposit 80 percent of Clean Water Act administrative and civil penalties paid by the parties responsible for the *Deepwater Horizon* oil spill into a newly established Gulf Coast Restoration Trust Fund. The trust fund would be used to fund restoration of natural resources and economic recovery in the Gulf Coast region. The trust fund is to be allocated as follows (Figure V-13):

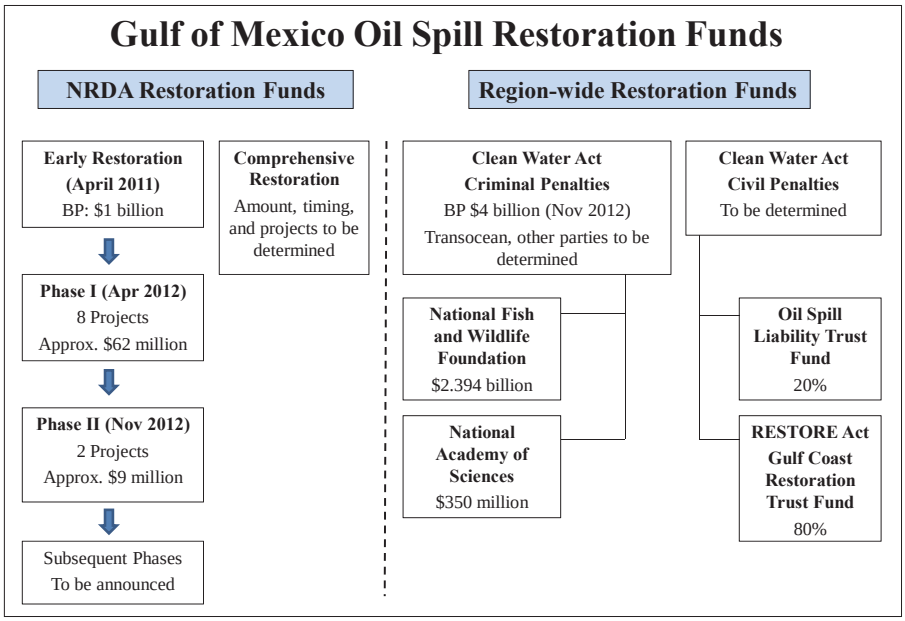

Figure V-13. Allocation of RESTORE Act Gulf Coast Restoration Trust Fund

Opportunities within the RESTORE Act for funding restoration projects for marine mammals, and also for monitoring the potential effects of restoration projects on marine mammals, exist in funding provided directly to the states and to the Gulf Coast Ecosystem Restoration Council consistent with their mandates to mitigate damage to and restore fish, wildlife, and natural resources (section 1603). Opportunities to address marine mammal restoration and long-term monitoring and research also exist in funding provided to the Science, Observation, Monitoring and Technology Program (section 1604) and the Centers for Excellence (section 1605) (Figure V-14).

Use of criminal penalties: In November 2012 BP pleaded guilty to 14 counts of criminal action and agreed to pay $4 billion to resolve those charges; $2.7 billion of this was for environmental protection, restoration, and oil spill response, of which:

- $350 million would be provided to the National Academy of Sciences (NAS) over five years to establish a 30-year endowment for a human health and environmental protection program; and
- $2.4 billion would be provided to the National Fish and Wildlife Foundation (NFWF) over five years, with 50 percent of the funds for projects in the five affected Gulf states to remedy harm to injured or destroyed resources and the remaining 50 percent for projects in Louisiana for restoration of barrier islands or for Mississippi/Atchafalaya River diversion projects to create, preserve, and restore coastal habitat.

The BP criminal penalities also provide opportunities for conducting marine mammal restoration and monitoring within the funds provided to NAS and NFWF.

Priorities for Marine Mammal Restoration Planning and Coordination

The total amount expected to be available over the long-term for restoration of the Gulf ecosystem provides an unprecedented opportunity to address long-standing needs for research, monitoring, and restoration across the Gulf region. The state and

59 The RESTORE Act is contained under Title I, subtitle F, Sections 1601-1605 of Public Law 112–141, the "Moving Ahead for Progress in the 21st Century Act of 2012"

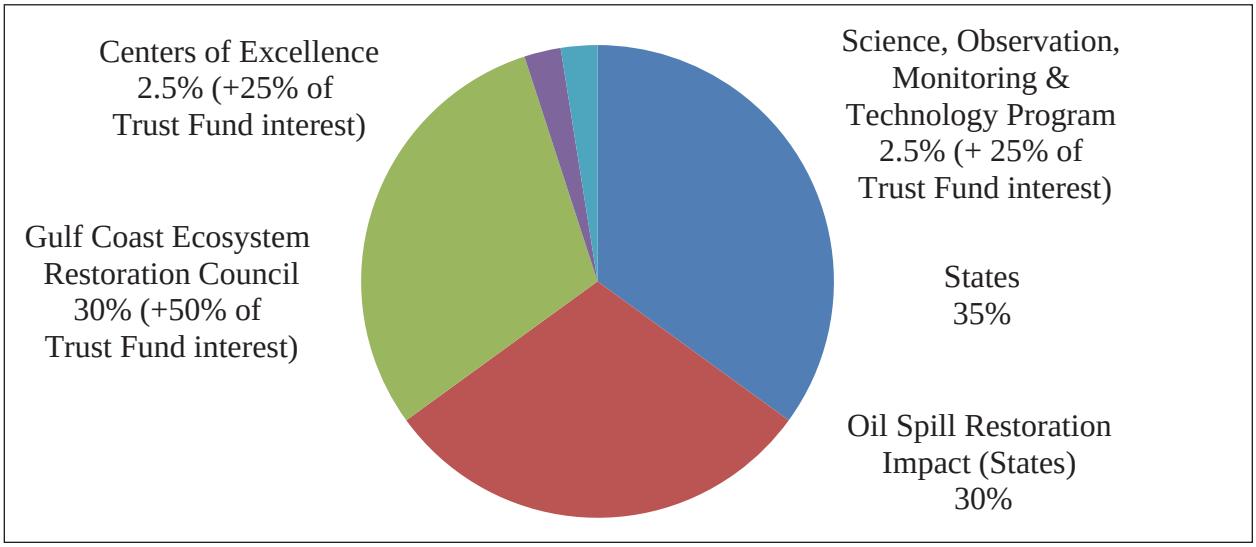

Figure V-14. Sources and distribution of funds for Gulf of Mexico ecosystem restoration

federal agencies and not-for-profit organizations charged with implementation of the various restoration tasks face a significant challenge to ensure that research, monitoring, and restoration efforts address the region's highest priorities and are science-based, complementary, and not unnecessarily duplicative.

In this regard, the Commission wrote to NOAA/NMFS in December 2012 with recommendations for restoration of injured Gulf marine mammals under the NRDA restoration planning process. The Commission highlighted the lack of pre-spill baseline information, summarized the potential effects of oil spills and response activities on marine mammals, and provided a preliminary assessment of injuries to marine mammals resulting from the *Deepwater Horizon* oil spill. The Commission recommended two primary restoration priorities for marine mammals and specific restoration projects under each priority, consistent with the Commission's earlier Statement of Research Needs (Marine Mammal Commission 2011). These were—

- **Restoration priority 1:** Assessing long-term injuries resulting from the oil spill and response activities and promoting recovery from those injuries; specific projects included—
  - marine mammal stock assessment surveys;
  - enhancement of the Gulf marine mammal stranding program;
  - live capture/release health assessments;
  - contaminants analyses;
  - assessment of the physiological effects of oil and chemical dispersants on marine mammals and model species; and
  - environmental studies (including prey studies);
- **Restoration priority 2:** Addressing other risk factors for the Gulf's marine mammal stocks; specific projects included:
  - establishing or expanding fishery observer coverage;
  - minimizing incidental takes in fisheries and indirect effects of fishing on important prey species;
  - monitoring sound levels;
  - minimizing effects of sound; and
  - reducing other environmental impacts.

Because the species and stocks vulnerable to—and likely affected by—the spill were found in a range of inshore, coastal, and offshore ecosystems, the Commission recommended that NOAA/NMFS work with the other Trustees to include in the restoration plan activities to ensure long-term monitoring, assessment, and recovery of all of the marine mammal stocks found in inshore, coastal, and offshore ecosystems throughout the northern Gulf.

The Commission further recommended that NOAA/NMFS work with the other Trustees to:

- ensure that restoration projects include long-term monitoring to determine whether

the projects are achieving their goals and injured resources are indeed being restored;
- develop a science-based, multidisciplinary project selection process that is open to all appropriate researchers and encourages data sharing; and
- manage restoration projects using an adaptive management approach that informs and guides management of Gulf resources over the long term.

An Ecosystem Services Approach to Injury Assessment and Restoration Planning

As reported in the Commission's 2010–2011 report, early in 2011 the NAS/National Research Council (NRC) Ocean Studies Board began a study of the *Deepwater Horizon* oil spill effects on the Gulf's ecosystem services, to be conducted by the newly established Committee on the Effects of the *Deepwater Horizon* Mississippi Canyon 252[60] Oil Spill on Ecosystem Services in the Gulf of Mexico. In 2012 the Committee issued an interim report on its investigations entitled Approaches for Ecosystem Services Valuation for the Gulf of Mexico After the *Deepwater Horizon* Oil Spill (NRC 2012). According to the report, "ecosystem services" are the benefits people receive from the natural resources and processes that are provided by ecosystems; under the Oil Pollution Act, the NRDA Trustees must determine injuries to natural resources and associated lost ecosystem services in order to seek appropriate compensation from the parties responsible for the spill. The Committee suggested options for estimating the value of lost services "to capture, value, and restore the full breadth of impacts to the ecosystem and the public" from an event as large and complex as the *Deepwater Horizon* oil spill—an ecosystem subject to both natural and human forces of change. As such, the baselines against which injuries are assessed are both spatially and temporally dynamic. The Committee highlighted the bottlenose dolphin unusual mortality event as an example of how a lack of pre-spill baseline data makes determination of spill-related injuries challenging, especially given the many possible direct and contributory causes of that event.

The Committee found that the traditional NRDA models used to quantify damage to habitats or resources resulting from a spill may not capture the whole value of lost ecological services resulting from an event as large as the *Deepwater Horizon* oil spill and that initial assessments of damage may not identify sufficiently the long-term impact of such a spill. The Committee suggested that the use of habitat or resource equivalency approaches under NRDA should be broadened to include an ecosystem services approach that considers the extent to which affected areas or resources generate benefits to the public. It noted that an ecosystem services approach would require not only well-established baseline data but also a detailed understanding of the complex linkages among various ecosystem components, both of which are lacking in the Gulf. Despite the challenges, such an evaluation would help in expanding the range of mitigation and restoration options to include ecological services. The Committee's final report will be available in the spring of 2013.

60 Mississippi Canyon 252 was the OCS lease block in which the *Deepwater Horizon* well was located.

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Chapter VI

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

This program is administered by the National Marine Fisheries Service in collaboration with more than 100 partner organizations including nonprofit organizations, aquaria, universities, and coastal state and local governments. The program has six core components:

- Stranding response
- Whale entanglement response
- Unusual mortality event response
- Marine mammal health assessments
- The John H. Prescott Marine Mammal Rescue Assistance Grant Program[1]
- The National Marine Mammal Tissue Bank

In 2009 the Marine Mammal Health and Stranding Response Program released an environmental impact statement[2] for core actions that it has undertaken since 2001. These involved efforts to—

- establish stranding agreement criteria and develop a stranding agreement template;
- recommend that carcasses of chemically euthanized animals be transported off site for disposal;
- issue new stranding 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;

1 www.nmfs.noaa.gov/pr/health/prescott/
2 www.nmfs.noaa.gov/pr/health/eis.htm

- continue the current activities of the disentanglement network on the U.S. East Coast, 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.

The year 2012 marked the 20th anniversary of the Marine Mammal Health and Stranding Response Program. In those 20 years, the program personnel have responded to more than 50,000 stranded marine mammals, rehabilitated and released more than 10,000 animals, and led investigations of 56 marine mammal unusual mortality events. The Marine Mammal Health and Stranding Response Program has had many successes, including identification of novel infectious diseases and biotoxins that cause marine mammal die-offs and that can impact human health, development of technologies to humanely disentangle marine mammals from fishing lines, and guidance on reducing ship strikes of whales off the U.S. northeast Atlantic coast that led to changes in shipping lanes.

Significant mortality events involving marine mammals have drawn attention to environmental changes, and health changes in marine mammals have identified the impact of ocean change, such as increasing ocean noise, pollution, increasing spread of pathogens, and harmful algal blooms. In 2012 efforts were initiated to incorporate marine mammal health and stranding response into broader ocean health monitoring. The Marine Mammal Commission worked with the National Marine Fisheries Service and the U.S. Geological Survey to start a North American wildlife health strategy and, with the Integrated Ocean Observing System, to develop a marine animal health observing system. Technical experts in the field of wildlife, fish, and ecosystem health participated in an October 2012 workshop to discuss the current status of wildlife health programs in the United States and Canada and to explore ways to better coordinate and collaborate regarding collective response to wildlife health and disease issues. Representatives from federal and state governments, academia, and non-governmental organizations with an interest in wildlife health worked to align interests, identify partnering opportunities, and create a plan to move forward. To raise the profile of ocean health issues in the ocean observing community, a white paper (Gulland et al. 2012) was submitted and discussed at the IOOS Summit[3]. A final Summit report is expected early in 2013.

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 stocks but also may serve as important indicators 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 web site.[4] Managing stranding response is difficult as a variety of analyses must be conducted, and response activities require coordination of numerous response organizations and laboratories. Managing the response is particularly difficult when large numbers of strandings occur over a short period of time and the cause or causes are not readily apparent. The numbers reported in this chapter should be considered approximate, provisional, and contingent on a final update and verification by the National Marine Fisheries Service.

In 2012 consultations with the Working Group on Marine Mammal Unusual Mortality Events led to designation of one new event involving bottlenose dolphins in Texas, the closure of six events (North Carolina harbor porpoises [*Phocoena phocoena*], Alaska sea otters [*Enhydra lutris*], California cetaceans, California harbor porpoises, Virginia bottlenose dolphins, and South Carolina bottlenose dolphins) and additional sampling and analysis guidance on the remaining six open unusual mortality events.

3 www.iooc.us/summit
4 www.nmfs.noaa.gov/pr/health/mmume/

Accounts of the six events open as of the end of 2012 follow, beginning with the new event declared in 2012. Information on previous events can be found online[4] and in previous Commission annual reports.

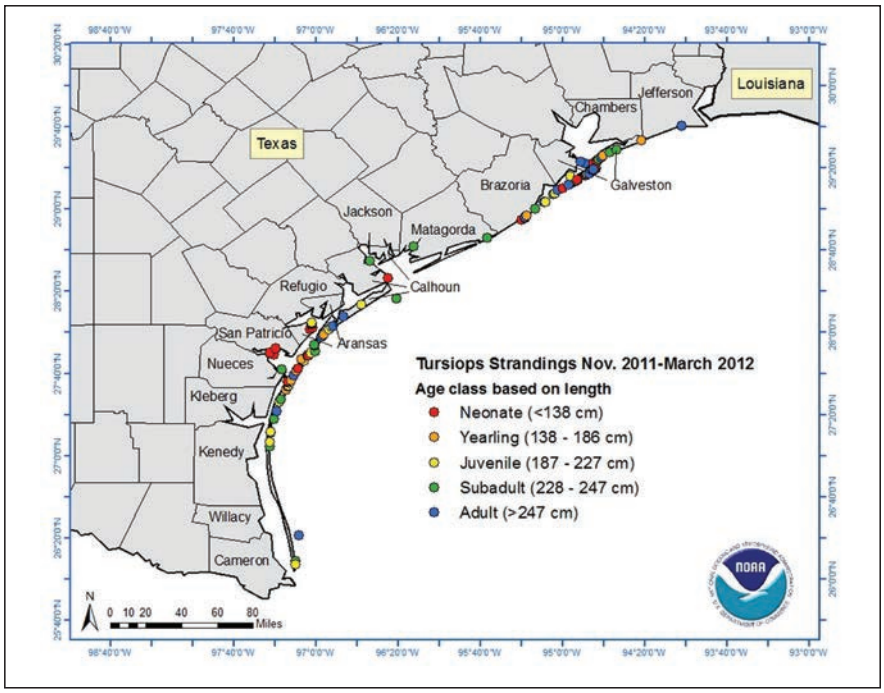

Figure VI-1. Bottlenose dolphin strandings on the Gulf coast of Texas between November 2011 and March 2012 by age/size class.

Mortality Event Declared in 2012

Bottlenose dolphins in Texas: Between November 2011 and March 2012, 123 bottlenose dolphins stranded across five counties in Texas (Figure VI-1). Only four animals were found alive. Preliminary findings as to cause included infection in the lung, poor body condition, and discoloration of the teeth. In four animals, a black/grey, thick mud-like substance was found in the stomachs. The strandings were coincident with a harmful algal bloom of *Karenia brevis* that started in September 2011 in southern Texas, but researchers have not determined if that was the cause of the event. As of the end of 2012 there were no red tide blooms occurring in the region, and stranding rates had returned to normal levels.

Mortality Events Declared before 2012

Northern Gulf of Mexico cetaceans: Beginning in February 2010 the number of reported cetacean strandings increased in the Gulf of Mexico. Most were bottlenose dolphins. The working group was initially consulted in March 2010 regarding an increase in strandings in Lake Pontchartrain, Louisiana, and it was reviewing information on elevated stranding levels in the wider northern Gulf when the *Deepwater Horizon* 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 3 November 2010 to the end of 2012, an additional 598 cetaceans stranded (Table VI-1).

The strandings in 2011 included unusually high numbers of young of the year including calves born prematurely, calves stillborn, and apparently full-

Table VI-1. Stranded cetaceans from Franklin County, Florida, to the Texas/Louisiana border by month (Source: 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	13
Total 2012	24	24	46	17	11	9	9	5	10	14	16	14

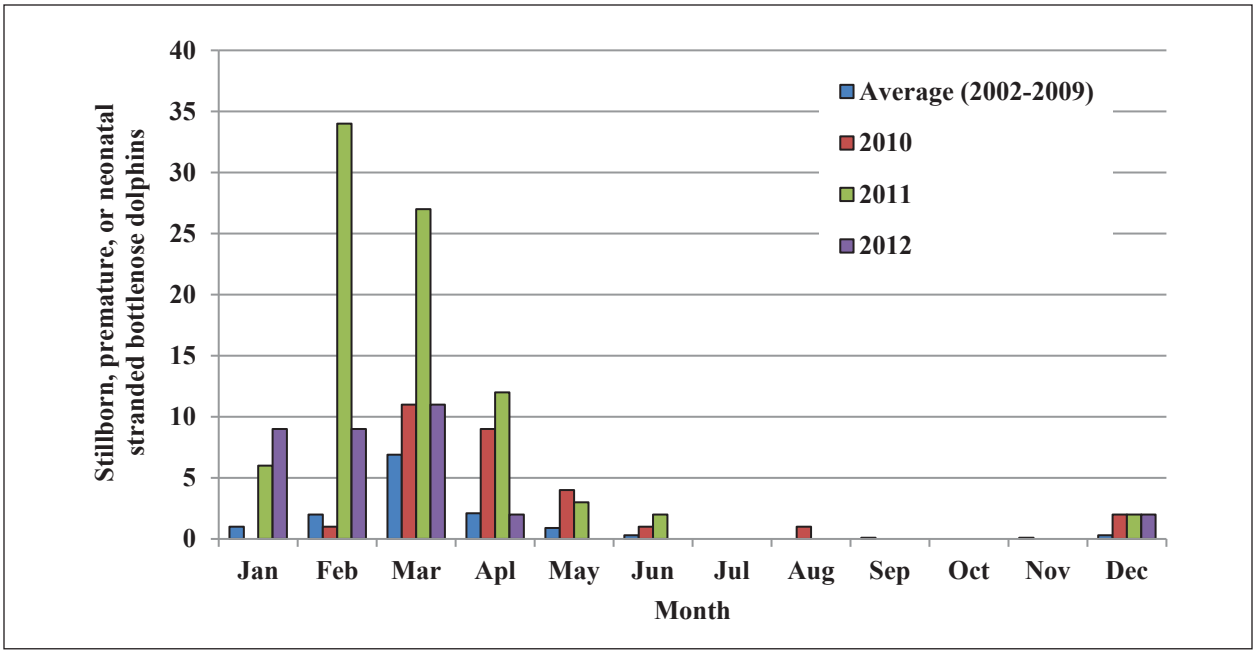

Figure VI-2. Stranded young of the year bottlenose dolphins from Franklin County, Florida, to the Texas/ Louisiana border with reported actual or estimated whole carcass lengths less than 115 cm (partial carcasses excluded). (Source: National Marine Fisheries Service)

term calves (<115cm in length) that died shortly after birth (Figure VI-2).

Determining the cause or causes of this unusual mortality event has been a challenge, and many tests for common causes, such as harmful algal blooms, have produced negative results. However, by the end of 2012 the investigators had tested 54 dolphins for *Brucella*, with 18 testing positive.[5] At the end of 2012 this event was still officially open and the investigation was ongoing.

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 (as described in the Commission's 2010–2011 report) the deaths were declared as 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. At the end of 2012 the guidelines were in draft form and they should be finalized and approved in 2013. As was the case in 2010, the additional deaths in 2011 likely had a substantial effect on the status of this population. At the end of 2012 a final report on the event was pending and a closure request is expected with the final report in 2013.

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 suggested that malnutrition was not the problem. Instead, they had similar skin lesions (ulcerative dermatitis), indicating some other cause. By September 2012 an additional 34 animals were considered as part of the unusual mortality event. Influenza A H3N8 was confirmed in five harbor seals that stranded in New Hampshire in mid-September/early October 2011 (Anthony et al. 2012). Additional samples from animals stranded in Maine, New Hampshire, and Massachusetts are being evaluated. The investigative team submitted an official request to the Working Group for closure of this event on 18 December 2012. Further information on the event and the potential risks to humans can be found on the unusual mortality event website.[6]

5 www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico2010_brucella.htm

6 www.nmfs.noaa.gov/pr/health/mmume/pinniped_northeast2011.htm

Arctic pinnipeds and walruses: Between mid-July 2011 and January 2012 more than 60 dead and 75 live diseased seals, most of them ringed seals (*Pusa hispida*), were reported in Alaska. Walruses (*Odobenus rosmarus*) with similar clinical symptoms also were reported in Alaska and Chukotka (Russia), although no walrus deaths had been reported by the end of 2012. The cause, distribution, and severity of the disease and its population effects are not known. The National Marine Fisheries Service declared this an unusual mortality event on 16 December 2011. The Service and the Fish and Wildlife Service continue to work with stranding 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 has 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. In the summer of 2012 approximately 50 affected ice seals were reported (primarily bearded [*Erignathus barbatus]* and ringed seals) in the Bering Strait region from the April–June subsistence harvest. Since then, no further cases have been reported in walruses and there have been only sporadic suspected cases seen in seals during the fall harvest. At the end of 2012 this event remained open and ongoing.

Bottlenose dolphins in Texas: In February and March 2008 at least 129 bottlenose dolphins and one melon-headed whale (*Peponocephala electra*) stranded along the Texas coast, with the majority of strandings in Galveston and Jefferson Counties. Investigators suspect that most, if not all, of the bottlenose dolphins were from the coastal stock although they have not confirmed that assumption using genetic analyses. 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. Tests for algal biotoxins from 11 dolphins revealed low levels of okadaic acid and domoic acid from toxic plankton in the feces and stomach contents of three dolphins (Fire et al. 2011). The limited evidence suggests that a harmful algal bloom caused this event and may also have caused the 2007 event involving 64 bottlenose dolphins in the same area and season. However, at the end of 2012 the stranding network was still conducting the investigation, and the Service had not officially closed the event.

Marine Mammal Health Assessments

Working with partners from the stranding network, academia, and across the National Oceanic and Atmospheric Administration, the Marine Mammal Health and Stranding Response Program helps fund or conducts health assessment studies on wild marine mammal populations to develop baseline data, monitor trends and investigate the impact of disease, natural toxins, and pollution. The program uses this information to determine health trends in marine mammals and marine ecosystems, focusing on species and diseases that have been involved in unusual mortality events. In 2012 ongoing studies included health assessments of bottlenose dolphins in the Gulf of Mexico, endangered North Atlantic right whales (*Eubalaena glacialis*), Hawaiian monk seals (*Monachus schauinslandi*), northern fur seals (*Callorhinus ursinus*), California sea lions (*Zalophus californianus*, and Atlantic harbor seals *(Phoca vitulina*).

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 a competitive process to grant financial awards for participants of marine mammal stranding networks to carry out 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 funds and awarded Prescott grants. For fiscal year 2012 technical and merit review panels evaluated 71 eligible proposals and selected 39 for funding. The National Marine Fisheries Service distributed $3.4 million among those 39 projects. In addition, $250,000 was set aside at the National Fish and Wildlife Foundation to be used for future Prescott emergency grants.

The President's fiscal year 2013 budget request to Congress did not include funding for the John H. Prescott Grant Program. Nevertheless, the National Marine Fisheries Service accepted applications for the fiscal year 2013 grant cycle, should Congress provide funding in fiscal year 2013. In October 2012 the National Marine Fisheries Service closed their solicitation for 2013 proposals, having received 60 eligible proposals. The fiscal year 2013 technical review was held in December 2012.

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Chapter VII

MARINE MAMMAL – FISHERY INTERACTIONS

Most marine mammal species suffer serious injury and mortality from fishery interactions at some time within their geographic range. Direct, or operational, interactions include unintended or incidental catch by fishing gear; 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). These interactions can be severe for marine mammal populations (e.g., Lewison et al. 2004, Kraus et al. 2005, Turvey et al. 2007, Slooten and Dawson 2010) but also can have a significant economic impact on fishermen (e.g., Mariá-Brotons et al. 2008, Forney et al. 2011, Rafferty et al. 2012). Indirect, or ecological, interactions include competition with fisheries for prey (target) populations, depletion of marine mammal prey populations by overfishing, damage or destruction of marine mammal habitats by fishing, and degradation of ecosystem integrity and function by fishing (Dayton et al. 1995).

Each year, direct fishery interactions result in injuries to or the deaths of thousands of marine mammals in U.S. fisheries and hundreds of thousands worldwide. During the 1990s, an estimated annual average of more than 3,000 cetaceans and 3,000 pinnipeds were incidentally caught or entangled in U.S. fisheries (Read 2008). Almost all of the estimated cetacean bycatch (> 99 percent) involved harbor porpoises, dolphins, and toothed whales other than sperm whales. Gillnet fisheries accounted for most of these serious injuries and deaths—84 percent of cetaceans and 98 percent of pinnipeds.

The National Marine Fisheries Service has characterized the threats to 21 species or populations of marine mammals that are listed as endangered under the Endangered Species Act.[1] Twelve taxa have multiple threats; for one, climate change is the main threat, and for the remaining taxa bycatch is the first or second greatest threat. One of these species, the baiji or Yangtze River dolphin (*Lipotes vexillifer*), is now believed to be extinct, largely as a result of bycatch (Turvey et al. 2007). Currently the marine mammal most threatened with extinction is the vaquita (*Phocoena sinus*), an endemic porpoise of the northern Gulf of California that has been decimated by bycatch in a Mexican artisanal shrimp gillnet fishery. The first survey of this species was conducted in 1997 (Jaramillo-Legorreta et al. 1999) and the most recent in 2008 (Gerrodette et al. 2011). In just 11 years the estimated population size declined by 67 percent, from 567 to 245 animals, presumably because of bycatch in fisheries. In addition to the vaquita, freshwater, estuarine, and coastal populations of dolphins and porpoises and the Mediterranean monk seal (*Monachus monachus*) are significantly threatened by gillnets.

However, it is not only rare species that are threatened by fishing. Multiple studies have documented the loss of thousands of common and striped dolphins (*Delphinus* spp. and *Stenella coeruleaoalba*, respectively) over the last two decades in the Mediterranean Sea and elsewhere around the world (references in Reeves et al. in press). Indeed, most species are affected to some degree. The recent compilation of the literature on bycatch in gillnets by Reeves and colleagues (in press) found that at least

[1] http://www.nmfs.noaa.gov/pr/species/esa/mammals.htm

75 percent of odontocete, 66 percent of pinniped, 64 percent of mysticete, and 100 percent of sirenian species have been documented as bycatch in gillnets since 1990. They reported that although bycatch reporting has improved in some regions, good data on bycatch continue to be lacking in many parts of the world, a concern echoed by others (e.g., Lewison et al. 2011). Reeves et al. (in press) identified as the most important finding of their analysis of the literature that "the threat of bycatch in passive fishing gear is far from resolved and is likely growing rather than receding."

Furthermore, bycatch numbers typically are underestimates, often substantially so, because many fisheries do not have observers onboard their vessels, not all marine mammal injuries and deaths are recorded even when observers are onboard, and fishermen operating without observers onboard typically do not report their interactions with marine mammals (Moore et al. 2009, Read et al. 2006, Karp et al. 2011). 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 (Read et al. 2006).

The ecological effects of fishing on marine mammals have the potential to be at least as severe, but they have received less attention by scientists and fishery managers, in part because of the difficulties of understanding complex marine food webs and ecosystems. Modern fishery management is designed to reduce the biomass of fished stocks by 40 to 60 percent relative to their biomass if they were not fished (Walters and Martell 2004). The goal of such fishing is to achieve the optimum yield, which in the United States is based on the maximum sustainable yield as reduced by any relevant economic, social, or ecological factors. Removing 40 to 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 (Plagányi and Butterworth 2005). In addition, some types of trawl and dredge fishing have been shown repeatedly to alter significantly 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, Hilborn 2011). Nevertheless, both operational and ecological interactions reasonably can be expected to increase in the future as marine mammal populations recover from previous depletion and as human populations continue to grow, thereby increasing the demand for seafood and the ecological footprint on marine habitat.

This chapter goes into detail on U.S. efforts to manage fisheries interactions. It describes the Commission's interactions with aspects of federal fisheries management including the regional stock assessment reports, take reduction team activities, changes to fisheries observer programs, proposed rulemaking concerning imports of fish and fish products, tuna-dolphin interactions, and pinniped-fisheries interactions related to the Bonneville Dam, Washington.

The Marine Mammal Protection Act establishes a regime for assessing the status of marine mammal stocks in U.S. waters and reducing the incidental take in commercial fisheries. The Act requires the National Marine Fisheries Service and Fish and Wildlife Service to assess the status of all marine mammal stocks in U.S. waters. In addition, the National Marine Fisheries Service, in consultation with the Fish and Wildlife Service, monitors the incidental take of marine mammals by commercial fishing operations, classifies fisheries based on their relative level of incidental take, and implements fishery management measures or take reduction plans to address situations where incidental take is not sustainable. The results of these efforts are evident in the annual stock assessment reports and take reduction team recommendations and plans, which are discussed in the following sections. The National Marine Fisheries Service did not publish a List of Fisheries in 2012.

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, which were described in its 2010–2011 annual report. In this section we describe those comments and the Service's responses, which were published on 21 May 2012 when the Service gave notice that the reports were final (77 Fed. Reg. 29969).

General Comments

The Commission expressed its 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, which means that managers are more likely to err by under-protecting, or even over-protecting, marine mammals.

Marine mammal population surveys: Noting that resources for conducting needed population surveys have been inadequate, the Commission recommended that the Service develop a nationwide, five-year schedule for carrying out stock assessments that describes the funding and ship and aircraft time needed to complete marine mammal population surveys. The Service agreed that such a schedule would be useful and reported that it was developing a strategic plan to focus on resource acquisition and a prioritization scheme to meet stock assessment goals. The Service said it expected that the plan would address the economic value of conducting regular stock assessments, identifying data needs, and revising performance measures to track stock progress. The plan was under development but had not been completed by the end of 2012.

Observer effort: The Commission noted that, like previous stock assessments, the 2011 stock assessments suffered from an inadequate accounting of marine mammal bycatch. 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 are known to 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 Service replied that in 2011 it published the first national bycatch report (Karp et al. 2011), which included information on bycatch sampling and estimation methods, a framework for evaluating the quality of bycatch estimates, and performance measures for monitoring improvements to bycatch data quality and estimates over time. It noted that the plan also identified gaps in existing observer coverage with specific recommendations for additional resources required to improve bycatch data collection and estimation methods, which will form the basis of a funding strategy to support adequate observer programs for all living marine resources. Further, the Service pointed to recent improvements in observer coverage, including increased coverage in the North Carolina inshore gillnet fishery and the Gulf of Mexico menhaden purse seine fishery. Significantly, the Service reported that it was preparing to observe the Southeast Alaska drift gillnet fishery. Observer effort in this fishery was initiated by the Service in 2012.

In addition, the Commission recommended that, in order to significantly improve its performance, the Service should partner with state fishery management agencies, the fishing industry, and other stakeholders to develop a funding strategy that would substantially improve the extent and level of observer coverage and data collection concerning incidental serious injury and mortality of marine mammals within five years. The Service did not respond to the core of this recommendation that substantially improving coverage and incidental take data collection will require a community-wide funding strategy. Instead, the Service pointed to its ongoing efforts to improve its capacity to address marine mammal interactions through the actions of its take reduction teams, gear development, and research on fishery interactions.

Observer program limitations: The Commission argued that observer programs alone do not provide a sufficient basis for evaluating marine mammal-fishery interaction rates. For example, 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. Therefore, the Commission recommended that the Service develop alternative strategies for collecting information on mortality and serious injury levels in fisher-

ies for which entanglements are difficult to detect or quantify using traditional observer programs. In its response, the Service agreed that observer coverage is not particularly helpful or practical in certain fisheries and stated that it was 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 Commission is encouraged that the Service reported that it is working to develop or increase requirements for gear-marking for pot/trap fisheries to help identify gear that may be recovered from an entangled animal.

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 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 (*Phocoena phocoena*) 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 thus 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 (*Pseudorca crassidens*) stocks. From 2005 to 2009, an average of 21 false killer whales from the Hawaiian pelagic stock were taken in the Hawaii-based deep-set longline fishery. In 2009 the estimate for the number of 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 the 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 of managing transboundary stocks by comparing their potential biological removal levels (PBR; 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) to their total human-related take, not just the take occurring in the U.S. Exclusive Economic Zone. The Service responded that it was preparing a comprehensive international action plan for marine mammal conservation and that it expected to release the plan in mid-2012. The Service released its international action plan in October 2012.[2] The Service also pointed out that it collaborates closely with Canada and regional fisheries management organizations on the research, monitoring, and management of target species and bycatch.

Addressing all human-related risk factors: The Marine Mammal Protection Act clearly indicates that the PBR level calculated from stock assessment information is to be compared to the total level of 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 other risk factors. To address this problem, the Commission recommended that the Service consider the various approaches for integrating all human-related risk

[2] http://www.nmfs.noaa.gov/ia/reports/immap.pdf

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. The Service did not respond to the substance of the Commission recommendation but did cite related requirements in the Act with which they are not fully complying.

Atlantic and Gulf of Mexico Stock Assessment Reports

In 2011 the Commission recommended a number of changes to stock assessment efforts for the Atlantic and Gulf of Mexico. Several of the more important were as follows.

Pinniped surveys: As in 2010 the Commission again noted the shortcomings of stock assessment information for gray seals (*Halichoerus grypus*) and harbor seals (*Phoca vitulina*) and repeated its recommendation for better survey effort. The Service reported some progress in this area: tagging harbor seals to obtain the data need to correct abundance survey data and analyzing archived images from past monitoring surveys to estimate pup numbers in Massachusetts and Maine and non-pup numbers in Massachusetts.

Bottlenose dolphins: Here, too, the Commission repeated its 2010 recommendation that the Service improve stock assessments for bottlenose dolphins in the Atlantic, especially in the Gulf of Mexico. The lack of information in the Gulf of Mexico has undermined efforts to characterize the effects of multiple unusual mortality events in that region. The Service reported that it has conducted research on bottlenose dolphin (*Tursiops truncatus*) genetic stock structure in North Carolina and on abundance and stock structure in areas affected by the *Deepwater Horizon* oil spill.

Other cetacean stocks: The Commission reiterated its concerns regarding the lack of current information on cetaceans in the Gulf of Mexico, especially in light of the *Deepwater Horizon* oil spill. The Commission emphasized the need for a comprehensive plan to give decision-makers a clear rationale for providing the resources needed. The Service pointed to the Southeast Fisheries Science Center's 2008 marine mammal program strategic plan and its 2007 north-central Gulf of Mexico bottlenose research plan, but noted that both plans need to be updated to account for new information and resource restraints. In addition, the Service noted its collaboration with the Commission following the *Deepwater Horizon* spill to develop a marine mammal research plan for the Gulf.

Alaska Stock Assessment Reports

In 2011 the Commission recommended a number of changes to stock assessment efforts for the Alaska region. Several of the more important were as follows.

Ice seals: The Commission stated a widely held concern that ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*), and to a lesser extent ribbon seals (*Histriophoca fasciata*) and spotted seals (*Phoca largha*), are at risk of severe decline in the foreseeable future. The declining coverage and thinning of sea ice eventually will disrupt the species' breeding and feeding habitats and potentially their reproductive rates and survivorship. The effects of climate disruption on these species may be further confounded by increased shipping, oil and gas development, military activities, commercial fishing, and coastal development—all facilitated by the warming temperatures and changes in sea ice dynamics.

At least at this time, traditional surveys for these species do not appear to be feasible. As is the case for the walrus (*Odobenus rosmarus*) and polar bear (*Ursus maritimus*), new assessment strategies are needed (Vongraven et al. 2012). The areas to be assessed are vast and remote, the work is expensive, the existing information is limited, and the efforts will be confounded by numerous technical difficulties. Nonetheless, it would be inappropriate simply to step back and allow the pending changes in the Arctic to occur without assessing them and doing whatever is possible to minimize their impact on Arctic ecosystems.

Therefore, the Commission recommended that the Service develop a long-term assessment strategy to characterize abundance, stock status, and trends of the ice seal species and guide management measures that will minimize the effects of Arctic climate

change. In response, the Service stated briefly that it understood that the viability of Arctic marine mammals in the context of a rapidly changing environment is a concern. More importantly, the Service suggested that limited resources will constrain its ability to deal with the impact of climate change on Arctic marine mammals. The Service noted that as resources become available it will assess Arctic marine mammal abundance, trends, stock identification, foraging ecology, and vital rates, and how these features change in response to environmental and anthropogenic perturbations.

As a vital part of the recommended long-term assessment strategy plan, the Commission recommended that the Service increase substantially its efforts to (1) collaborate with the Alaska Native community to monitor the abundance and distribution of ice seals and (2) use seals taken in the subsistence harvest to obtain data on demography, ecology, life history, behavior, health status, and other pertinent topics.

With respect to the recommendation that the Service collaborate with Alaska Native communities, the Service stated that although it works closely with co-management partners and Alaska Native communities to collect stock assessment data on ice seals, it would like to improve its collection of data on subsistence harvests, which has been hindered by resource limitations.

With respect to the recommendation to monitor ice seals, the Service stated that it was aware that there are no current abundance estimates for any of the four species of ice-associated seals and that substantial resources would be required to obtain such information. Somewhat encouragingly, the Service reported that joint U.S.–Russia surveys were planned for spring 2012 and 2013 and are expected to result in abundance estimates for ribbon and spotted seals; however, surveys of ringed and bearded seals are not planned because of resource constraints.

Information on the 2012 joint surveys is available on the National Marine Mammal Laboratory Polar Ecosystems Program's web page.[3] Synoptic surveys for bearded, ribbon, ringed, and spotted seals were conducted in collaboration with Russian researchers. The aerial survey, which employed innovative paired thermal and visual imaging to detect and identify seals on the ice, was conducted over an extensive array of transect lines during April and May of 2012 (Figure VII-1).

Eastern North Pacific right whale stock: As in its 2010 comments, the Commission drew attention to the critically endangered status of the eastern North Pacific right whale (*Eubalaena japonica*) population and its belief that this population cannot sustain any human-caused mortality. The 2011 stock assessment included a PBR level of 0.05, which could be interpreted as a take limit of no more than one whale in 20 years. Experience from the Atlantic indicates that right whales are susceptible to entanglement in gillnets and trap gear, which suggests the potential for interactions with the several gillnet and pot fisheries that operate in the Bering Sea and Gulf of Alaska, including within areas designated as North Pacific right whale critical habitat.

Right whales also are vulnerable to ship strikes and, as Arctic sea ice recedes and industrial activities increase, ship traffic will pose an increasing risk. The Commission recommended that the Service do everything possible to ensure that vessels of all types operating in those areas are aware of the need to protect the North Pacific right whale and take every practicable step to minimize the probability of entanglements and ship strikes.

In response, the Service listed actions it has taken (providing information cards to vessels, working with partners and commercial vessel operators) but did not provide assurances or even the impression that it is taking "every practicable step." To ensure that the Service is giving the best possible advice to vessel operators, the Commission also recommended that the agency continue its efforts to better describe the distribution and movement patterns of North Pacific right whales, especially outside of designated critical habitat. The Service acknowledged the importance of gathering this information and stated that it would continue to seek resources to study this critically endangered population. The Service has indicated elsewhere that in 2012 it had virtually zero expenditures related to research on this species.

[3] http://www.afsc.noaa.gov/Quarterly/amj2012/divrptsNMML2.htm

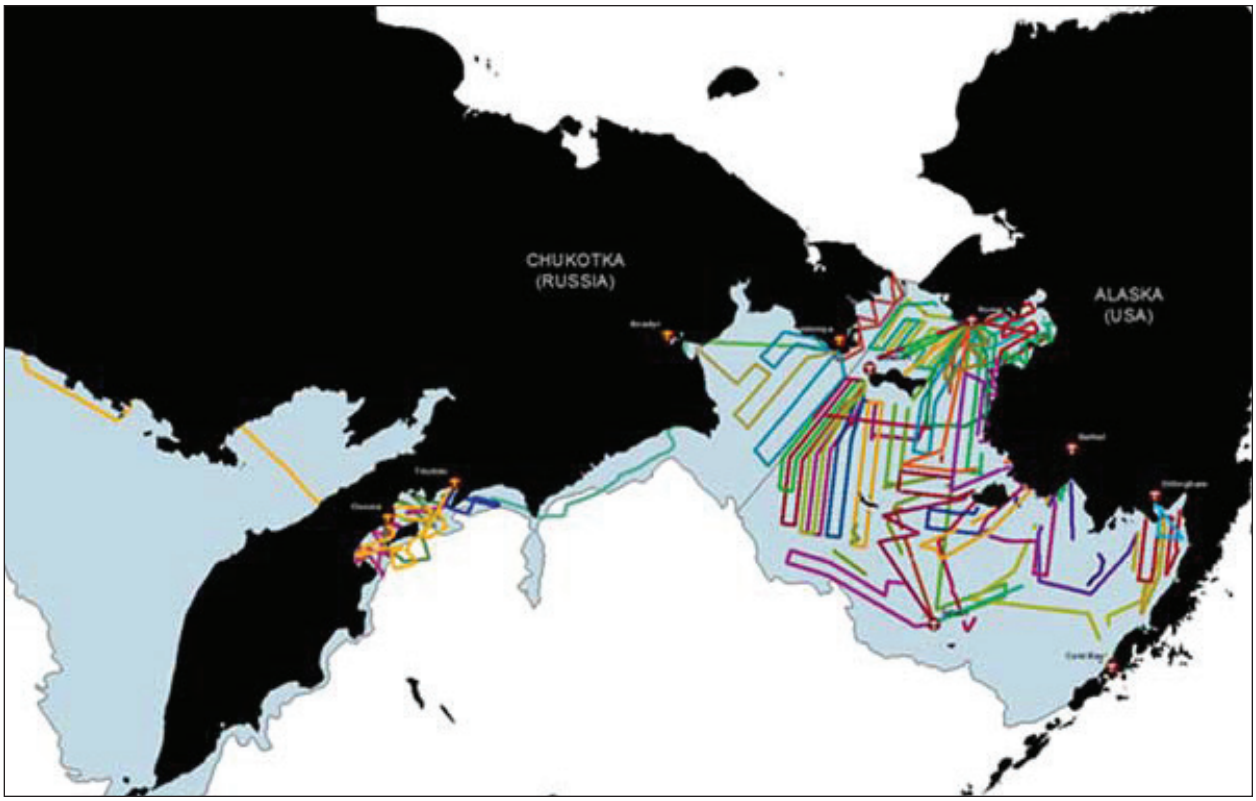

Figure VII-1. U.S. and Russian ice-seal survey tracks covered in April and May 2012 (Moreland et al. 2012).

Pacific Stock Assessment Reports

In 2011 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 recommendations were as follows.

Harbor seal surveys: The Commission repeated its 2010 recommendation that the Service conduct the necessary surveys to update stock assessment reports for harbor seals along the Oregon and Washington coasts and in Washington inland waters. The Service responded that the Alaska Fisheries Science Center and the Northwest Regional Office requested 2011 survey funding but did not receive the funds.

Pacific Islands cetaceans: On 11 May 2010 the Commission wrote to the Service regarding its management and conservation responsibilities for cetaceans in its Pacific Islands region. The Service has now conducted several surveys and is in the process of generating abundance estimates and creating stock assessments for many of the cetaceans in the Hawaiian Archipelago and Palmyra Atoll. The Commission commended those efforts but pointed out that much more remains to be done, particularly around remote Pacific island groups such as American Samoa, Guam, the Northern Marianas, and Wake Island. The Commission recommended that the Service enhance existing collaborations with other central and western Pacific countries to obtain the data necessary to generate stock assessments for all Pacific Islands cetaceans within U.S. jurisdiction and to seek new opportunities, such as collaborating with the Navy, to leverage resources for accomplishing this challenging task. The Service agreed and reported that it was actively engaged in collaborative research within the Pacific islands region to generate the data necessary for future stock assessments.

Stock Assessments—2012

On 7 August 2012 the National Marine Fisheries Service announced that its draft stock assessment reports for marine mammals were available for

review (77 Fed. Reg. 47043). The Commission provided comments on 14 November 2012. As of the end of the year, the Service had not finalized its stock assessment reports.

Large Whale Mortality and Serious Injury from Entanglement and Ship Strikes

The Commission noted that entanglement in fishing gear and ship strikes are important causes of mortality and serious injury for some whale species. Entanglement was determined to be the cause of death for 36 percent (31 of 87) of North Atlantic right whales (*Eubalaena glacialis*) necropsied between the 1970s and 2009 (van der Hoop et al. 2013). In addition, photographs of whales with scars indicate that the rate of entanglement is increasing: 57 percent of individuals photographed through 1989 showed evidence of entanglement (Kraus 1990), 62 percent through 1996 (Hamilton et al. 1998), 73 percent through 2002 (Knowlton et al. 2005), and 83 percent through 2009 (Knowlton et al. 2012). This trend suggests that actions taken in recent decades to reduce the frequency and severity of entanglements have not been sufficient, if they have been effective at all (Kraus et al. 2005, Knowlton et al. 2012). The records also indicate that observer programs are ineffective at detecting entanglements. Despite the evidence from photographs, observers have not reported a single entanglement since 1993.

The Commission further noted that the problem is not restricted to North Atlantic right whales. Robbins (2009) analyzed humpback whale (*Megaptera novaeangliae*) photographs taken in the Gulf of Maine and found that 65 percent of 207 individual whales seen for the first time in the period from 2003 to 2006 (inclusive) bore entanglement scars. Only nine (6 percent) of those 207 whales were seen entangled. Robbins (2009) estimated annual entanglement-related mortality to be 19 to 29 whales per year, compared to an average of only three dead whales detected annually.

In addition, the Commission pointed out the difficulty of reliably assessing the number of whale deaths from ship strikes. Of the 87 necropsies described above, ship strikes accounted for 38 (44 percent) of the deaths. However, few of these events were reported when they happened (Laist et al. 2001). Whales killed by ship strikes generally are not detected until they either strand and are examined fully at necropsy or a ship arrives in port with a carcass on its bow.

The 2012 draft stock assessments generally provide thorough descriptions of the available evidence indicating serious injury and death from entanglement and ship strikes. However, the Commission believes that the available evidence almost certainly is not sufficient to describe the full extent of such injury and death. This shortcoming is well illustrated by the following statements from the 2012 stock assessment reports:

- Central North Pacific humpback whale stock. "This estimate [of human-related serious injuries and mortalities] is considered a minimum because not all entangled animals strand and not all stranded animals are found, reported, or cause of death determined."
- California/Oregon/Washington fin whale stock. "Additional mortality from ship strikes probably goes unreported because the whales do not strand or, if they do, they do not have obvious signs of trauma."
- Western Atlantic North Atlantic right whale stock. "Annual rates calculated from detected mortalities should not be considered an unbiased estimate of human-caused mortality, but they represent a definitive lower bound. Detections are haphazard, incomplete and not the result of a designed sampling scheme. As such they represent a minimum estimate of human-caused mortality, which is almost certainly biased low."

The Commission concluded that the existing monitoring strategy is not sufficient to characterize the true serious injury and mortality rates from entanglements and ship strikes and is not acceptable. The Commission suggested that improving detection of these events will require new thinking and likely will require new fishing and shipping technology. Both are imperative because those rates already are considered significant for some listed species, and ship strikes at least are likely to increase over time with

growth in international trade (commercial vessels account for about 95 percent of that trade by weight).

Service scientists have recognized the need to address these risk factors. For example, Wade et al. (2011) call for a plan to reduce or mitigate current and future threats to whales from ship strikes and entanglement in fishing gear. With that in mind, the Marine Mammal Commission recommended that the Service convene a series of workshops to explore novel ideas for detecting entanglements and ship strikes, improving information on their frequency and trends, reducing the bias in estimates of large whale mortality and serious injury caused by these interactions, and considering possible options for addressing these risk factors.

Addressing All Sources of Human-caused Mortality and Injury

The Commission pointed out to the Service that section 117 of the Marine Mammal Protection Act requires that the National Marine Fisheries Service and Fish and Wildlife Service describe in each stock assessment 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.

The Commission recognized, however, that fully assessing all human-caused mortality and serious injury is not feasible under current conditions and with available resources and technology. Human-caused marine mammal deaths may not be detected, reported, or attributed correctly as to the cause. The last of these possibilities is particularly true when the cause of death is indirect, such as the result of fisheries competition or habitat degradation. Reliably assessing the number of marine mammal deaths and serious injuries is difficult even when the cause involves direct or operational interactions between marine mammals and fisheries. Marine mammals killed in nets may fall out of them before the nets are fully retrieved or they may be retrieved by unobserved vessels. Van der Hoop et al. (2013) summarized 1,762 large whale deaths in the United States and Canada and attributed 28 percent to entanglement, ship strikes, or other human causes, 14 percent to non-human causes, and 57 percent to undetermined causes. The Commission believes that these results indicate that the existing information and monitoring of fisheries and shipping by the Services do not detect all, or even most, marine mammals killed or seriously injured by human activities.

A recent life-table analysis of demographic data from 14 species of cetaceans in the Gulf of Mexico estimated the number of individuals expected to die annually (Williams et al. 2011). A comparison of those estimates to the known number of deaths based on strandings suggested that, for all species combined, just 2 percent of deaths are detected (range=0 to 6 percent). In regions with little land (e.g., the Hawaiian Islands) or very low population human density (e.g., Alaska), the detection rates are likely to be even lower. To the extent that marine mammal carcasses killed by ship strikes or entanglement are similar to those that die from natural causes (i.e., have similar rates of drift, sinking, scavenging, detection, etc.), these results suggest that most human-caused mortalities are not detected.

The Commission considered how to improve estimates of human-caused marine mammal mortality and serious injury. Although the obvious solutions (e.g., comprehensive observer coverage, complete necropsies on all stranded carcasses) are expensive and/or logistically or technologically difficult, if not infeasible, the Commission suggested that the knowledge base is sufficient to develop resourcing and research plans to substantially improve estimates of human-related serious injury and mortality rates. Accordingly, the Commission recommended that the Service, in conjunction with the Fish and Wildlife Service, more completely assess human effects by (1) developing a framework for describing the full effects, both direct and indirect, of all human activities that may cause serious injury or mortality of marine mammals, and (2) incorporate that framework into stock assessment reports so that decision-makers are informed not only about the known information on a stock but also about the degree of uncertainty regarding the other risk factors that may be affecting the stock's status and what would be required to reduce that uncertainty.

Insufficient Trend Data

The Commission also reminded the Service that section 117 requires that each stock assessment describe the current population trend, including a description of the information upon which these are based. Although a stock's trend is one of the most important measures of its status, the Service did not estimate the current population trend in many 2012 stock assessment reports, generally concluding that the available data were insufficient for that purpose. That conclusion may have been warranted in many, if not all, cases because of insufficient data on population size over time, irreconcilable differences in assessment methods, or insufficient resources to conduct the needed analyses. However, the Commission argued that even when stock assessment scientists cannot describe the reasons for a trend, it is vital to know whether a stock is increasing, stable, or declining and, if not stable, what is the best estimate of the rate of change. Consequently, the Commission recommended that the Service consider the feasibility and advisability of providing explicit technical guidance on trend analysis and, for each stock assessment with no trend analysis, require an explicit explanation for why such an analysis could not be completed.

Updating Stock Assessments

Each year the Service updates the information in dozens of stock assessments. However, the Commission noted that the updating process is not consistent across stocks and regions, and it is not difficult to find omissions, errors, and inconsistencies in the stock assessments or cases where information is almost outdated before analyses are completed. For example, the draft stock assessment report for harbor seals in Alaska cites three different date ranges when reporting estimates of annual mortality from subsistence harvest; two in the text (one in reference to a table) and a third in the table legend itself. The report for the North Atlantic right whale provides an example where important new information on the distribution of the species is omitted, undermining the reliability and credibility of the report. The Commission provided a list of such errors and omissions in the form of staff comments on the report. In addition, the Commission recommended that the Service establish an internal review process to standardize the updating of the stock assessment reports within and across regions and consider using a copy editor to check for completeness, errors, and consistency.

Atlantic and Gulf of Mexico Stock Assessment Reports

North Atlantic right whale: Because the stock assessment report for the North Atlantic right whale did not include information on all sources of confirmed or suspected serious injury and mortality, the Commission recommended that the National Marine Fisheries Service expand the report to include all entanglements and serious injuries and deaths for the period 2006 to 2012.

Gulf of Maine harbor porpoise: The Commission noticed that although the 2011 population estimate, 61,959 (CV=0.32), was considerably lower than the previous complete population estimate of 89,054 (CV=0.47) from 2006, the draft stock assessment report did not include a trend analysis. Taken at face value, the difference suggested a 30 percent decline in just five years. The draft report did not discuss the difference or provide potential explanations for the apparent decline. Given concern that the high levels of bycatch of this stock may be causing it to decline, the Commission recommended that the Service expand the report either to include a trend analysis and explanation or to describe the reasons that the analysis and explanation cannot be provided and how it plans to rectify the problem.

The same report noted that the estimate of takes in Canada's Bay of Fundy sink gillnet fishery during 2011 was based on a Canadian official's expert opinion, and that it might be possible to estimate bycatch rates from 2002 to 2010 based on an analysis of port-side catch levels. Given the lack of recent bycatch estimates for this fishery, the Commission recommended that the Service contact Canadian officials to (1) determine the feasibility of an analysis of port catch levels to estimate the number of harbor porpoise caught in the Bay of Fundy sink gillnet fishery since 2001, and (2) pursue the development of a reliable means for estimating harbor porpoise bycatch in the bay.

Gray and harbor seals: The Commission reminded the Service that the report did not include up-to-date estimates of gray and harbor seal abundance in the northwest Atlantic. Researchers that have visited breeding sites such as Muskeget and Monomoy Islands indicate that seal populations have changed at those sites in recent years. Updating the reports with new information on abundance, distribution, and the relationship between U.S and Canadian populations of these species is necessary for a number of reasons, such as evaluating the potential effects of renewable energy development, quantifying the impact of gillnet and trawl fishery bycatch, and identifying the causes and significance of unusual mortality events.

Harbor seals in the Gulf of Maine experienced unusual mortality events in 2003, 2004, and 2006. The Commission commended the Service for its efforts to obtain a minimum raw count of non-pup gray seals from archived photos and acknowledged that efforts were underway to obtain a survey correction factor and update abundance estimates. However, concurrent tagging programs and aerial surveys required to reliably conduct such counts have not been possible to date. Therefore, the Commission repeated its recommendation from 2010 and 2011 that the Service conduct the required surveys of the western North Atlantic harbor and gray seal stocks, incorporate the results into the stock assessment reports, and use that information in its management of those stocks and the risk factors affecting them.

Alaska Stock Assessment Reports

Ice seals: The loss of Arctic sea ice arising from climate change poses considerable risks to ringed and bearded seals and, to a lesser extent, ribbon and spotted seals. The loss of sea ice likely is affecting—and will continue to affect—prey, predators, and reproductive habitat for these seals. Increased shipping, oil and gas development, military activities, commercial fishing, and coastal development—all facilitated by the warming temperatures and the loss of sea ice—will pose additional risks to these species.

The Commission commented on this issue in its letter to the Service regarding the 2011 stock assessment reports. The Service responded that it understood that the viability of Arctic marine mammals in the context of a rapidly changing environment is a concern and stated that, as resources become available, it would assess Arctic marine mammal abundance, trends, stock identification, foraging ecology, and vital rates, and how these features change in response to environmental and anthropogenic perturbations.

The Commission recognized that the Service is well aware of the risks posed by climate disruption to ice seals and argued that the challenge associated with conserving these species should not be dismissed or discounted because of a lack of resources. Further, the Commission stated that, at the least, the Service should be making a strong case for the needed resources and considering what tools it must develop and implement to prevent such extirpations or extinctions. Research to assess abundance, trends, distributions, movements, and various measures of individual animal health will help guide the conservation effort, but the Service—and the Commission as well—should be considering what other measures, in addition to research, should be initiated in the near future. Moreover, the agencies should be considering what steps might be taken now to avoid or minimize the risks from other risk factors such as shipping, fishing, energy development, military activities, tourism, and coastal development in the face of diminishing sea ice.

Accordingly, the Commission invited the Service to meet with it to discuss the impending changes in the Arctic and consider the development of (a) a long-term assessment strategy to characterize population abundance, stock status, and ecological and human interactions as climate disruption continues, and (b) a long-term management strategy that anticipates the risks to ice seals and develops proactive measures to avoid or minimize those risks.

As the Commission has long argued and the Service has demonstrated by example, working with Alaska Natives greatly benefits both research and conservation efforts, and more such cooperation will be essential as the Arctic climate continues to change. To maximize research and management capacity in the Arctic, the Commission recommended that the Service continue its efforts to (1) collaborate with

the Alaska Native community to monitor the abundance and distribution of ice seals and (2) use seals taken in the subsistence harvest to obtain data on demography, ecology, life history, behavior, health status, and other pertinent topics. Among other things, subsistence harvests provide opportunities to collect valuable data on ice seal populations in many parts of their ranges while minimizing logistical requirements and costs.

Harbor seals: The Commission pointed out deficiencies in the stock assessments for harbor seals. The Service's 2005 guidelines for preparing stock assessment reports state that recovery factors of 1.0 should be used for stocks of unknown status only if N_{min}, R_{max}, and the estimated numbers of serious injuries and deaths are unbiased and the stock structure is unequivocal (National Marine Fisheries Service 2005). The draft reports for three harbor seal stocks (north Kodiak, south Kodiak, and Cook Inlet) have unknown population trends and unknown status, and the information available for these stocks does not meet the guidelines for using a recovery factor of 1.0. If a recovery factor of 0.5 is used, as indicated by the guidelines, their PBR values would be reduced to 128, 320, and 657, respectively. Importantly, the subsistence harvest from the north Kodiak stock, which is 131, would exceed this stock's PBR value of 128 without taking into account serious injury and deaths from other human activities. To address this concern, the Commission recommended that the Service revise its stock assessments for the north Kodiak, south Kodiak, and Cook Inlet harbor seal stocks by (1) reducing the recovery factor to be consistent with the Service's 2005 guidelines, (2) recalculating their PBR values, (3) updating the stock assessment reports accordingly, including changing the status of the north Kodiak stock, and (4) working with Native communities to ensure that harvest numbers, when combined with other human-related serious injuries and deaths, do not exceed the PBR for the north Kodiak stock.

North Pacific right whales: The Commission summarized some important facts regarding the eastern population of the endangered and little-known North Pacific right whale. In the last two centuries, this population was severely reduced by whaling and is now perilously close to extinction (Brownell et al. 2001, Clapham et al. 2004, Wade et al. 2006, Wade et al. 2011). Totaling perhaps no more than 30-some individuals, the population should not be expected to sustain any human-caused mortality. Available information on this population is not sufficient to quantify reliably the risk it faces from stochastic events, but there are good reasons to believe that it is at risk from human activities in the Bering Sea, western Gulf of Alaska, and at least portions of the North Pacific.

Experience with the North Atlantic right whale suggests that right whales are particularly susceptible to ship strikes that cause serious injury and death. This small eastern North Pacific population occupies the southeastern Bering Sea during the summer and fall and, based on the seasonal movements of other right whale species and populations, it almost certainly winters south of the Bering Sea in warmer, calmer waters. To leave and return to the Bering Sea, the whales must use the Aleutian Island passes and, given their occurrence near Kodiak Island, they likely move through Unimak Pass. Unimak Pass is just 18.5 km wide at its narrowest point and is on the great circle route between the west coast of North America and Asia. From October 2006 through September 2007, nearly 4,500 commercial vessels transited the pass (Transportation Research Board 2008). In addition, another 1,700 local vessels, mostly fishing boats, used the pass during that same period. These totals equate to an average of nearly 17 vessels per day. With the relatively steady increase in global commercial shipping, combined with the loss of Arctic sea ice and increased human activities in the Arctic, vessel traffic through Unimak Pass can be expected to increase substantially in the foreseeable future.

North Atlantic right whales also are highly susceptible to entanglement in gillnet and trap gear. As noted earlier, Knowlton et al. (2012) found that 83 percent of all known North Atlantic right whales photographed through 2009 bore scars indicative of entanglement in fishing gear. From 1970 to 2009, 31 western North Atlantic right whales from a population of roughly 350 to 400 are known to have died from entanglement in fishing gear (van der Hoop et al. 2013). Because most deaths at sea are not detected, the actual number killed is almost certainly higher.

These data suggest the potential for similar, possibly fatal interactions of eastern North Pacific right whales with the several gillnet and pot fisheries that operate in the Bering Sea and Gulf of Alaska, particularly within the North Pacific right whale critical habitat areas located in those waters.

The Commission suggested that the serious injury or death of a single whale from a ship strike or entanglement would increase substantially this population's risk of extinction. To prevent such occurrences, the Commission recommended that the National Marine Fisheries Service conduct the research needed to (1) analyze and describe the risks to North Pacific right whales associated with increasing shipping traffic in the Bering Sea and North Pacific, paying particular attention to Unimak Pass, and of entanglement in fishing gear and (2) use that information to design management measures that will minimize the risk of ship strikes and entanglement, and that it ensure its activities do not significantly increase the risk faced by the whales.

In addition, given the urgent need for information on this critically endangered population, the Commission encouraged the Service to continue using a variety of tools, such as satellite telemetry and passive acoustic monitoring, to better inform management and conservation efforts. The Commission suggested that those efforts be conducted cautiously so that the risks from research are minimized.

The Commission then noted that the Service has not analyzed acoustic data collected since 2007 that could provide insight into the behavior, movements, and distribution of whales in this population. The Commission recommended that the Service make every effort to expedite the analysis of all passive acoustic, satellite telemetry, and other data available for North Pacific right whales, update the stock assessment report accordingly, and use those data to develop protective measures for this population.

Finally, the Commission suggested the statement in the draft stock assessment that there is no reason to believe that either Hawaii or Mexico have ever been anything except extra-limital habitat for the species is unjustified. Such migrations would be entirely consistent with migratory patterns of other right whale species and populations. The Commission therefore recommended that the Service revise the stock assessment report for the North Pacific right whale stock to indicate that, based on knowledge of migratory patterns of similar species, Hawaii and Mexico could be low-latitude habitats used more regularly by North Pacific right whales than is currently recognized.

Pacific Stock Assessment Reports

Sperm whales: Following the 1997 implementation of the Pacific Offshore Cetacean Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum six-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery off the West Coast dropped considerably (Barlow and Cameron 2003). Sperm whales (*Physeter macrocephalus*) were recorded to have been entangled only 10 times in more than 8,000 observed drift gillnet sets since 1990. Six observed entanglements occurred prior to the use of pingers in this fishery. Two entanglements (in 1996 and 1998) occurred in sets that did not use a full complement of pingers, and two animals were entangled in 2010 in a single net where a full complement of 40 pingers was used (Carretta and Enriquez 2012). However, because of the low estimated minimum abundance of sperm whales (751), the two entanglements in 2010 resulted in an estimated annual fisheries mortality of 3.8 individuals, which exceeded the PBR of 1.5 individuals for the California/Oregon/Washington sperm whale stock. Exceeding PBR usually would lead the Commission to recommend that the Service reconvene the take reduction team. However, sperm whale entanglements in the California drift gillnet swordfish fishery are infrequent, and the coefficient of variation for the mortality estimate is relatively high (0.95), which indicates the take estimate has considerable variability. Therefore, the Commission recommended that the Service first verify that compliance with the measures of the 1997 take reduction plan for sperm whales remains at a high level and monitor any changes in fishery effort that might systematically affect entanglement risk, and then reconvene the take reduction team only if either of those efforts reveals deficiencies.

Harbor seals: The Commission noted, again, that the abundance estimates for harbor seals along the Oregon and Washington coasts and in Washington inland waters currently are more than eight years old and are considered outdated based on standards that the Service has set and the Commission supports. Those harbor seals are taken in both gillnet and trawl fisheries, and new surveys to estimate abundance are needed to evaluate the significance of such takes. The Commission acknowledged that the Service had requested funding for both harbor seal and harbor porpoise surveys in this region in recent years, but that the surveys were not funded. The Commission commended the Service for recognizing the need for these surveys and recommended that the Service continue to plan and request funding for the necessary surveys to estimate abundance of Pacific coast harbor seals but also consider alternative approaches to update stock assessment reports for harbor seals along the Pacific coast.

Pacific Islands cetaceans: The Commission acknowledged the efforts of the Service to survey and generate abundance estimates for many of the cetaceans in the Hawaiian Archipelago and Palmyra Atoll but noted that much more remains to be done to meet the objectives of the Marine Mammal Protection Act, particularly with respect to assessing cetacean stock structure around remote Pacific island groups such as American Samoa, Guam, the Northern Marianas, and Wake Island. Information on the stock structure of three species—melon-headed whales (*Peponocephala electra*), pantropical spotted dolphins (*Stenella attenuata*), and rough-toothed dolphins (*Steno bredanensis*)—had been published recently or had been presented at recent meetings of the Pacific Scientific Review Group. All three species face threats from anthropogenic sources, including fisheries interactions and shooting, and management efforts are more likely to be effective if stock structure is accurately described. Therefore, the Marine Mammal Commission recommended that the National Marine Fisheries Service review all available information on stock structure for Pacific Islands stocks of melon-headed whales, pantropical spotted dolphins, and rough-toothed dolphins and update the stock assessment reports accordingly.

Take Reduction Teams

Section 117 of the Marine Mammal Protection Act directs the National Marine Fisheries Service and the Fish and Wildlife Service to prepare stock assessment reports for all marine mammal stocks in U.S. waters. In part, those reports must include findings as to whether each stock should be classified as "strategic." Strategic stocks are those that meet at least one of the following criteria: (1) the number of annual human-caused deaths or serious injuries exceeds their calculated PBR level, (2) the stock is listed as endangered or threatened under the Endangered Species Act, (3) the stock is designated as depleted under the Marine Mammal Protection Act, or (4) the stock is declining and is likely to be listed as endangered or threatened under the Endangered Species Act within the foreseeable future. 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 at which these fisheries incidentally kill or seriously injure marine mammals. Category I fisheries are those that take marine mammals frequently (i.e., greater than 50 percent of any stock's PBR based on an annual level average over the most recent five-year period), Category II are those with occasional takes (i.e., between 1 and 50 percent of any stock's PBR), and Category III have no or a remote likelihood of takes (i.e., less than 1 percent of any stock's PBR).

For all category I fisheries that take marine mammals from stocks classified as strategic, the National Marine Fisheries Service is to convene a take reduction team to prepare a recommended take reduction plan. The Act sets a goal for those plans of reducing deaths and serious injuries in strategic stocks to levels below PBR within six months and to an insignificant level approaching a zero mortality rate (defined as 10 percent of PBR) within five years. To date, no take reduction teams have been established for marine mammal stocks under the jurisdiction of the Fish and Wildlife Service.

For marine mammal stocks under the jurisdiction of the National Marine Fisheries Service, the Assistant Administrator for Fisheries appoints the members of take reduction teams representing rel-

evant fisheries, conservation groups, the scientific community, and involved federal and state agencies. The Service currently has seven take reduction teams (Table VII-1). Representatives of the Marine Mammal Commission participate on all but one of those teams. During 2012 either in-person or teleconference meetings were held for the false killer whale team, Atlantic pelagic longline team, bottlenose dolphin team, Gulf of Maine harbor porpoise team, and Atlantic large whale team. Results of all but the Atlantic large whale team, which is discussed in the North Atlantic right whale section in Chapter IV, are discussed below. The other teams were awaiting results of research and monitoring to determine the success of take reduction measures implemented before 2010 and are not discussed further.

False Killer Whale Take Reduction Team

The false killer whale is a large delphinid weighing up to 3,000 pounds (1,360 kg) that occurs in relatively discrete populations in tropical and subtropical regions around the world. They often 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. Bycatch in the U.S.-based longline fishery has been documented in waters around Hawaii and around Palmyra Atoll (1,000 nmi or1,852 km south of the island of Hawaii) as well as in international waters. In U.S. waters, at least four partially overlapping false killer whale populations interact with two Hawaii-based longline fisheries: a deep-set fishery for tuna and a shallow-set longline for swordfish. The four false killer whale populations currently recognized as being affected or potentially affected by those two Hawaii-based fisheries include (Carretta et al. 2012):

- Hawaii insular population: occurs principally within 75 nmi (140 km) of the Main Hawaiian Islands (MHI), numbers about 150 whales, has a PBR of 0.3, and has been designated as endangered under Endangered Species Act (77 Fed. Reg. 70915);
- Northwestern Hawaiian Islands (NWHI) population: occurs within about 50 nmi (93 km) of the NWHI and Kauai, is estimated to number about 550 whales, and has a PBR of 2.6;
- Hawaii pelagic population: occurs principally seaward of about 22 nmi (40 km) around the

Table VII-1. Take reduction teams established under the Marine Mammal Protection Act

Take Reduction Team	Year Established	Team Focus
Atlantic large whale	1996	Take of right, humpback, and fin whales in various Atlantic coast trap 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
Gulf of Maine/Mid-Atlantic 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-finned 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

MHI, and beyond the 200 nmi U.S. Exclusive Economic Zone (EEZ) around the Hawaiian Islands to an unknown distance; is estimated to number about 1,500 whales within the U.S. EEZ and has a PBR of 9.1 for areas inside U.S. waters; and

- Palmyra Atoll population: found within the 200 nmi U.S. EEZ of Palmyra Atoll, estimated to number about 1,330 whales, and has a PBR of 6.4.

Most of the bycatch by the two Hawaii-based longline fisheries is believed to be from the Hawaii pelagic population. Estimated bycatch levels exceed the population's estimated PBR level. Over the five-year period from 2006 to 2010, the number of false killer whales killed or seriously injured in the pelagic population is estimated to have averaged 13.8 whales per year within the 200-nmi EEZ around Hawaii and 11.3 whales per year in waters outside the U.S. EEZ (Carretta et al. 2012). Bycatch from the Hawaii insular stock, estimated at 0.5 whale per year over the same five-year period, also exceeds its calculated PBR level.

Development of a Draft Take Reduction Plan: In January 2010 the National Marine Fisheries Service convened the Hawaii False Killer Whale Take Reduction Team to recommend measures for reducing the bycatch of false killer whales in the Hawaii-based longline fisheries. As with all take reduction teams, the team was charged with reducing bycatch levels below PBR within six months and below the zero mortality rate goal (10 percent of PBR) within five years. The team reached consensus on a recommended take reduction plan that was submitted to the Service in July 2010.

Central features of the team's recommended plan called for using "weak" circle hooks on all deep-set longline vessels, combined with strong terminal gear, time-area closures, and training fishermen on ways to handle and release hooked or entangled whales. Weak hooks take advantage of the large size difference between false killer whales and targeted tuna weighing up to 350 pounds (160 kg). Because of their large size and stronger pulling force than targeted tuna, false killer whales may be able to straighten and escape from certain hooks used to catch tuna. The team recommended defining weak hooks as 14/0 to 16/0 circle hooks with shafts made from round wire not exceed 4.5 mm in diameter and a 10-degree offset or less. However, the team recommended that the Service conduct a pilot study to determine whether even weaker hooks (i.e., those with a smaller wire diameter, such as 4.0 or 4.2 mm) would have a substantial impact on the catch retention of the target species (bigeye tuna) . If the study showed that the use of 4.0 or 4.2-mm wire diameter hooks would not have a substantial impact on bigeye tuna catch rates, the team specified that their recommendation should be modified to require those weaker hooks in the deep-set fishery. The potential effectiveness of weak hooks as a mitigation measure is supported 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 larger bluefin tuna by more than half with no significant reduction in catch of yellowfin tuna (Foster and Bergmann 2010).

To ensure that weak hooks are the weakest part of the gear, the team recommended that all monofilament branch lines and leaders have diameters of no less than 2.0 mm and a 400-lb minimum breaking strength, and that any other materials (e.g., wire) used in the branch line or leader must have the same or greater breaking strength. The team did not recommend applying the weak hook measures 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 believed that bycatch reduction objectives could be achieved without requiring weak hooks in the shallow-set fishery because most swordfish fishing occurs north of the range of false killer whales and because 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 the times and boundaries of an existing fishery management zone to create a year-round longline exclusion zone around the MHI (Figure VII-2). The team also recommended expanding and clarifying marine mammal handling and release guidelines described at annual workshops held by the Service to instruct vessel captains and owners on how to

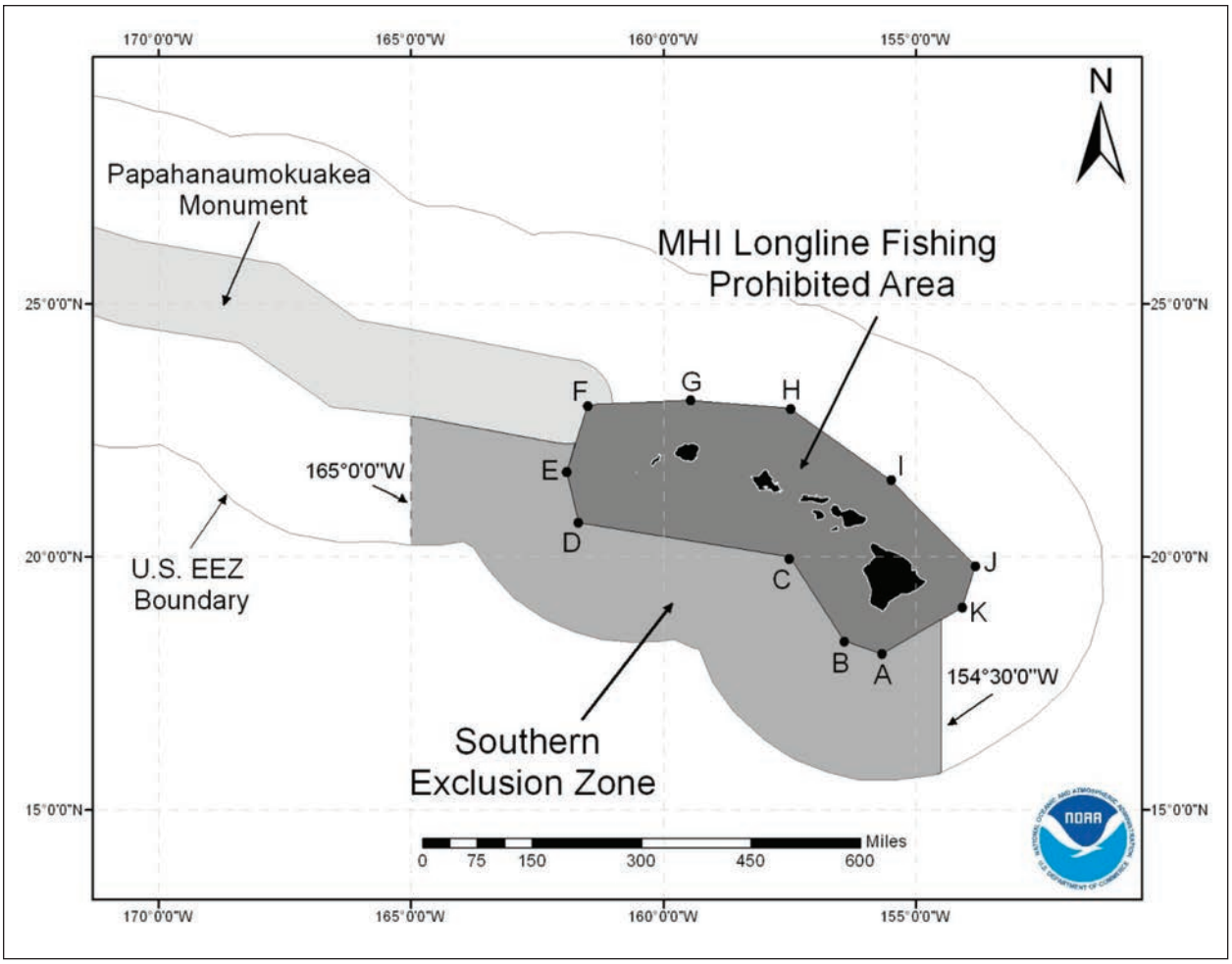

Figure VII-2. Location of the year-round Main Hawaiian Islands longline fishing prohibited area and the contingency southern exclusion zone established under the Hawaii false killer whale take reduction plan for reducing false killer whale bycatch in Hawaii-based longline fisheries.

respond to interactions with protected species, and to provide instructional placards to be posted on longline vessels.

In case the proposed measures proved inadequate for reducing bycatch, the team recommended a contingency measure for closing all waters south of the MHI in the U.S. EEZ to deep-set longline gear. The recommended area, called the southern exclusion zone (Figure VII-2), was to be closed if the deep-set longline fishery has the greater of the following "triggers": (1) two false killer whales[4] were observed/documented to have been killed or seriously injured within the Hawaiian Islands EEZ in any single year after the date of plan implementation; or (2) the number of observed serious injuries or deaths in the fishery within the Hawaiian Islands EEZ, when extrapolated to a fleet-wide estimate based on the percentage observer coverage for that year, exceeded the PBR in effect at the time of the take[5]. The first time this zone was closed, it was to remain closed until the next anniversary of the plan's implementation date. If two more observed deaths and serious injuries (or, when extrapolated, more than PBR)

[4] With a PBR at that time of 2.4 whales per year, even one observed mortality or serious injury, when extrapolated to a fleet-wide estimate from 20 percent observer coverage, would exceed the calculated PBR.

[5] The team recognized that between the time of its recommendations and the date that final rules go into effect, a new PBR level likely would 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.

occurred in two consecutive years, the zone again was to be closed immediately and to remain closed until certain criteria for reopening the zone were met.

Finally, the team recommended information-gathering activities to inform future team deliberations. In part, those recommendations called for additional research to test whether weak hooks would reduce landings of targeted tuna species. They also called for research to clarify operations and possible bycatch of false killer whales in Hawaii's shortline and kaka line fisheries and other fisheries, and for false killer whale photo-identification and genetic studies to improve understanding of stock structure. The team further recommended that fishery observers gather additional types of data and prioritized the needed information. In the fall and early winter of 2010, the Service conducted a three-month field test of weak hooks. 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-diameter shaft, which was thought to be typical of what the industry was using (Bigelow et al. 2012)

Review of the proposed take reduction plan: On 18 July 2011 the Service published a proposed rule to implement its False Killer Whale Take Reduction Plan (76 Fed. Reg. 42082). The proposed rule followed most of the team's recommendations. It proposed that deep-set fishing vessels be required to use weak circle hooks with shafts no larger than 4.0 mm in diameter, monofilament branch lines with at least 2.0-mm-diameter leaders, and leaders with breaking strengths of at least 400 lbs, and that any other material used in the branch line or leader (e.g., wire) have the same or greater breaking strength. It also proposed modifying the existing MHI longline fishing prohibited area to make its boundary roughly 50 nmi around the MHI year-round for both deep-set and shallow-set longline fisheries. However, instead of making that closure part of the take reduction plan rule, it proposed changing the fishery management regulations under which it had been established (i.e., rules authorized to manage western Pacific longline fisheries under the Magnuson-Stevens Fishery Conservation and Management Act). Consistent with the team's recommendations, the proposed rule also included provisions for captain and crew training and posting placards on release methods. Instead of requiring that deckhands notify the captain of each interaction, the rule stipulated that vessel captains be responsible for overseeing the handling of marine mammal bycatch events.

With regard to the consequence closure area south of the MHI, the proposed rule included the team's recommended southern exclusion zone but deviated from its recommended trigger. Instead of closing the area after two whales were observed to be killed or seriously injured in a given year, the Service proposed a formula to calculate a bycatch limit that it felt would better assure that PBR levels would not be exceeded when averaged over a five-year period. Given the very low PBR for the Hawaii pelagic stock of false killer whales at the time (i.e., 2.4 per year), the Service did not believe the team's recommended minimum trigger of two observer mortalities or serious injuries was sufficient to prevent PBR from being exceeded. That is, because only 20 percent of the fishing vessels must carry fishery observers, an observed take of just one whale would roughly extrapolate to five takes for the entire fleet, which would be twice its calculated PBR level of 2.4 whales per year at the time of the rule. If the southern exclusion zone were to be managed on an annual basis, the trigger would have to have been less than one observed mortality or serious injury, which was not feasible. Therefore, the Service concluded that the trigger needed to be calculated to consider takes across multiple years. Additionally, the Service believed a formula was needed to account for year-to-year variations in take levels and to avoid the need for new rulemaking each time a new population survey resulted in a new calculated PBR level.

Under its proposal, the Service planned to calculate and announce the number of observed takes that would trigger a closure of the zone each year, based on consideration of the potential five-year average. The trigger would be calculated to be the maximum number of deaths or serious injuries that could be observed in the fishery in a five-year period that would keep the five-year average annual take level below PBR. Under this approach, the fishery could take all its five-year allotment in the first year, assuming that the take levels could be zero for each of the next four years. If the zone was closed because the

trigger was met, the Service proposed closing the zone for the remainder of the fishing year (which matches the calendar year), and reopening it at the start of the next fishing year. However, if just one false killer whale was observed killed or seriously injured by the deep-set longline fleet within the Hawaii EEZ in any of the next four years, the southern exclusion zone would again be closed and would remain closed until the Service's Assistant Administrator decided to reopen it. Thus, unlike the team's recommendation, the proposed rule included no specific criteria in the regulations for reopening the exclusion zone, leaving that action to the discretion of the Service.

Many take reduction team members expressed concern over the proposed formula, the lack of explicit criteria for reopening the consequence closure, and the rationale for using the formula. At a 27–29 July 2011 team meeting to review the proposed regulations, team members discussed their concerns but failed to reach consensus on whether to support the changes proposed by the Service. On 17 October 2011 the Marine Mammal Commission wrote to the Service recommending that the agency adopt and implement the proposed rules subject to certain changes and clarifications. The Commission concluded that the Service's approach for calculating the trigger was reasonable, but that relying entirely on the discretion of the Service's Assistant Administrator to reopen the area was a significant departure from the team's advice. Noting that the rationale for using a formula to calculate a bycatch level for closing the southern exclusion zone seemed equally appropriate for reopening it, the Commission recommended that the Service adopt the proposed PBR-based formula for both closing and reopening the zone.

The Commission also expressed concern about authorizing the year-round 50-nmi closure around Hawaii under authority of the Magnuson–Stevens Fishery Conservation and Management Act (i.e., Chapter 50 CFR Part 665) instead of making it part of the take reduction plan rules authorized under authority the Marine Mammal Protection Act (i.e., Chapter 50 CFR Part 229). Because the Service usually defers to advice from fishery management councils to amend rules under the Magnuson–Stevens Act, the Commission was concerned that the rule could be changed at the urging of the regional fishery council with little or no weight given to advice by the take reduction team. The Commission therefore recommended that either all rules be included in 50 CFR Part 229 under authority of the Marine Mammal Protection Act or that language be added to require that review and advice by the False Killer Whale Take Reduction Team be sought before making any change to the proposed 50-nmi fishing closure around Hawaii.

Other comments offered by the Commission noted 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 was forged. It therefore recommended that the Service consider defining weak hooks based on a performance standard that measured the force required to straighten a hook (e.g., an average 205 pounds) rather than a specific wire diameter. 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.

Adoption of a final take reduction plan: On 29 November 2012 the Service adopted a final rule for the False Killer Whale Take Reduction Plan (77 Fed. Reg. 71260). The rule included most of the team's recommendations but with a few changes. Consistent with the team's recommendations, the rule expanded the content of protected species workshops for longline fishermen to include new information on false killer whale interactions, required Hawaii-based longline vessels to post placards on proper marine mammal handling and release guidelines as well as a placard on the need for deckhands to notify the captain in the event of marine mammal interactions, and revised the MHI longline fishing prohibited area to include boundaries set at approximately 50 nmi around all of the MHI year-round (Figure VII-2). In response to comments by the Commission and others, this Main Hawaiian Islands closed area was established under authority of the Marine Mammal Protection Act as part of the rules for the False Killer Whale Take Reduction Plan with conforming changes made to the existing rules for

closure under the Magnuson–Stevens Fishery Conservation and Management Act.

The final provisions for weak hooks and the southern exclusion zone closure, however, included some changes from the proposed rule. Instead of defining weak hooks as 14/0 to 16/0 circle hooks with a wire diameter of 4.0 mm, the agency chose not to specify a hook size and require a maximum wire a diameter of 4.5 mm. The agency decided not to define a hook size because larger sizes had been found useful for reducing bycatch of other species (e.g., sea turtles, seabirds, and certain fishes) and, as long as the required wire diameter was used, hook size was thought to be irrelevant for purposes of allowing the escape of false killer whales.

The minimum wire diameter was increased to 4.5 mm because fishermen pointed out that the weak hook field test had not been conducted in the season when the longline fleet caught the largest fish (i.e., in the spring). Thus, the Service concluded that results of the test were not adequate to demonstrate that 4.0-mm hooks would not result in a significant loss of target fish. In addition, whereas it had been thought that most Hawaii longline vessels used hooks made of 4.5-mm wire, new information became available indicating that only 20 percent used hooks with wire of that diameter whereas 80 percent of the fleet used hooks with wire 4.7 mm or thicker. With at least one documented case of a false killer whale having straightened a 15/0 hook made of 4.5-mm wire, the Service chose to adopt a 4.5-mm standard, which can be straightened by a pulling force of 303 pounds (138 kg), to define a weak hook for the Hawaii deep-set longline fishery pending further research into the efficacy of using of hooks with diameters of less than 4.5 mm. With regard to the Commission's recommendation that weak hooks be defined based on the pulling strength required to straighten the hook, the Service stated that it did not have sufficient information to require a particular bending strength for circle hooks. As recommended by the team, the final rules also required use of 2-mm branch lines and wire leaders with a breaking strength of 400 pounds (181 kg) or more to ensure that hooks would straighten before lines or leaders broke.

The final rules also adopted the team's recommended contingency closure (Figure VII-2) and reverted to a trigger for the closure that more closely reflected the take reduction team's initial recommendation. The Service noted that its concern over the possibility of exceeding PBR without triggering the contingency closure had been resolved by the new PBR (i.e., 9.1) calculated based on results of the new population survey in 2010 and reported in the draft 2012 SAR. Because 20 percent of the longline fleet carries fishery observers, one observed take would roughly extrapolate to five whales for the entire fleet and would not exceed PBR, but two observed takes would extrapolate to 10 whales, exceeding PBR and justifying closure of the southern exclusion zone. It remained concerned, however, that if the calculated PBR declined as a result of further analyses of survey data, such as attempts to account for false killer whale attraction to engine noise—a learned behavior possibly associated with following longline vessels—the trigger of two whales may again become inadequate. The Service therefore stated that it would continue to work closely with the team on possible refinements to the trigger and, that for the current rule, it was setting the trigger as the larger of (1) two serious injuries or deaths in the U.S. EEZ around Hawaii in a single year or (2) the smallest number of such interactions that, when extrapolated based on observer coverage, exceeds the population's PBR.

To minimize a delay in closing the southern exclusion zone after the trigger is exceeded, the agency agreed to conduct an expedited review of any interactions between false killer whales and longline vessels that might constitute a death or serious injury that would count against the trigger. Once closed, the zone would remain closed for the rest of the calendar year. If the trigger for closing the zone were met in two consecutive years, the zone would remain closed unless certain reopening criteria were met. The reopening criteria, specified in the plan regulations, are the same as those recommended by the team: (1) the Service determined that the closure was not warranted for some reasons (e.g., the bycatch was caused by non-compliant gear); (2) no false killer whales are taken by the deep-set fishery in the remaining open areas of the U.S. EEZ for two consecutive years; (3) in the two years following the closure, the overall take by Hawaii-based deep-set longline vessels in the U.S. EEZ around Hawaii,

around Johnston Atoll, and on the high seas is reduced by an amount that equals or exceeds what would be required to reduce bycatch to below the PBR in effect when the closure was triggered; or (4) the average number of deaths or serious injuries in the deep-set fishery in the remaining open areas of the U.S. EEZ around Hawaii in the previous five years falls below PBR for the pelagic population.

On 7 December 2012 the Service convened the False Killer Whale Take Reduction Team by Webinar to update members on the status of the new regulations and related developments concerning the recent longline fishing interactions with false killer whales and efforts to update the false killer whale stock assessment reports. The regulations for hooks and branch lines were not scheduled to become effective until 27 February 2013. Deferral of the effective date of these regulations was deemed appropriate because, although hooks and line meeting those specifications were commercially available and already used by some portion of the fishery, there was concern that their availability could be delayed due to the increased demand for new gear to satisfy the requirements.

Atlantic Pelagic Longline Take Reduction Team

The Atlantic pelagic longline team was established in 2005 to reduce the bycatch of short-finned and long-finned pilot whales (*Globicephala macrohynchus* and *G. melas*) and Risso's dolphins (*Grampus griseus*) in commercial longlines set for tuna and swordfish in U.S. waters in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. When the team was formed, the largest concern was for the incidental take of pilot whales, most of which were taken between South Carolina and Cape Cod, Massachusetts. After a series of meetings, the team reached consensus on a recommended take reduction plan in June 2006. In May 2009 the Service published a final rule to implement the plan (74 Fed. Reg. 23349), requiring three principal bycatch reduction measures.

First, based on evidence suggesting that shorter longlines had lower rates of pilot whale bycatch, vessels were required to limit the length of longlines to 20 nmi in the area where highest bycatch levels had occurred (i.e., a management area between Cape Hatteras, North Carolina, and New York). Second, to help collect data on bycatch rates and causes, it required vessel operators to call the Service at least 48 hours before leaving port if they intended to fish in the Cape Hatteras Special Research Area and to carry an observer if asked to do so. Third, it required all longline vessels fishing in the U.S. Atlantic EEZ to post on their vessels a placard describing proper marine mammal handling and release methods.

Assessing bycatch levels for pilot whales has been particularly challenging because the two affected species are almost identical in appearance and have overlapping ranges. Long-finned pilot whales migrate seasonally from the Delaware Bay to Greenland and Iceland, whereas short-finned pilot whales range from the Gulf of Mexico and Caribbean north to southern New England. In the area where the two species overlap—between the Delaware Bay and Cape Cod where bycatch rates have been highest—it was not been possible to reliably identify whales killed or seriously injured as one or the other of the two pilot whale species. For the same reason, population surveys were unable to distinguish the two species. The Service therefore considered both species together for purposes of estimating population abundance and bycatch. When the rules implementing the take reduction plan were first adopted, the best estimate of abundance for the two species combined was 31,139 whales with an average annual bycatch mortality of 166 pilot whales. At that time, an average 110 whales per year were killed by longline vessels, and the remaining 56 killed by various trawl fisheries. A combined PBR level for the two species was 249 whales per year.

New genetic analyses have improved information on the location and seasonality of the two pilot whales species in the area of overlap. From this information, it has been determined that the two species have different temperature preferences. Short-finned pilot whales prefer warm water along the Gulf Stream and long-finned pilot whales remain in cooler waters; thus, the area of overlap is generally occupied by one species or the other on a seasonal basis. Applying that information to sighting locations during previous population surveys, in 2012 researchers provided separate population estimates for the two species (Waring et al. 2012). Long-finned pilot

whales were estimated to number 12,619 whales, with a minimum of at least 9,333 whales and a PBR of 93 whales per year. Short-finned pilot whales were estimated to number 24,674 whales, with a minimum population of at least 17,190 whales and a PBR of 172. Based on the distribution and timing of pilot whale bycatch, it is believed the vast majority of bycatch in pelagic longline fishery has been short-finned pilot whales. However, because of uncertainty as to temperature conditions at locations where pilot whales have been caught in the past and because of limited genetic samples from bycaught animals, separate estimated bycatch levels for each species have not yet been developed. In 2012 the combined estimate of bycatch for both species averaged 162 whales between 2005 and 2009, of which 114 were taken by pelagic longline vessels and 48 were taken by trawl fisheries.

With little evidence that bycatch levels had been reduced as a result of the take reduction plan, the Service reconvened the pelagic longline team on 21–23 August 2012 to review new information on bycatch levels and recent research results, including additional genetic analyses and a new population survey. Based on that information, the team was asked to consider whether and how take reduction measures should be changed. Preliminary estimates of recent bycatch levels suggest that they had increased to more than 250 animals in 2011, which was within the range of past annual variations. It was still not possible to separate all bycatch by species.

Bycatch rates continued to be lower for longlines of 20 nmi or less in length. However, contrary to regulatory requirements, observer data revealed that some 60 percent of the vessels set lines longer than the 20 nmi—mostly between 20 and 30 nmi long but some up to 45 nmi. A Coast Guard official advised that its officers were not able to determine the length of deployed longlines when boarding vessels and that, given limited resources, the length limit for longlines was effectively unenforceable at present. The team therefore recommended that the Service, in consultation with the Coast Guard, make every reasonable effort to ensure compliance and suggested using all available data to send warning letters to known violators. It also suggested exploring technological means of monitoring mainline lengths remotely by placing GPS beacons that could be attached to the first and last buoy of each string.

During its 2012 meeting, the team also was updated on additional genetic analysis to distinguish between the two species of pilot whales. Analyses to date suggest complex movement patterns with some whales tending to remain in particular areas and others making medium to long-range movements, including some moving from the Gulf of Mexico into the Atlantic Ocean. In the summer of 2011 a new population survey was conducted. Preliminary results suggested that the new abundance estimate for the short-finned pilot whales would be about 20,000 whales, slightly lower than the previous estimate but not statistically different. Accordingly, PBR was expected to be somewhat lower than the previous level of 172 when updated final stock assessment reports are published in 2013. A new estimate for the number of long-finned pilot whales was not yet available.

Recognizing that further mitigation measures appeared necessary to meet bycatch reduction goals, the team recommended that research be undertaken as expeditiously as possible on potential gear modifications, particularly the use of weak hooks. Weak hooks, which take advantage of the size difference between pilot whales and the tuna and other fish targeted by longlines, would theoretically straighten and release a large pilot whale but, because of the smaller size of fish sought by longline vessels, would continue to catch target species at the same rate. The team urged that the weak hook studies be undertaken in close cooperation with gear manufacturers and fishermen, particularly fishermen working out of northern ports where bycatch levels have been high and resistance to using weak hooks may be greater. The team also established a research working group to meet by conference call to update and prioritize an earlier list of research-related recommendations. Finally, the team reviewed and broadly endorsed a strategy to monitor and assess both compliance with the take reduction plan requirements and the effectiveness of those measures.

Bottlenose Dolphin Take Reduction Team

Bottlenose dolphins are killed or seriously injured in gillnet, pound net, and crab trap fisheries between New York and Florida. In the 1990s take levels were estimated to exceed 200 dolphins per year and were thought to be exceeding the PBR level for at least some stocks in that region. The Service therefore convened a take reduction team in 2001 to reduce those takes below PBR, but the team struggled to assess the effects of incidental bycatch and to identify appropriate mitigation measures. This was because information was insufficient to distinguish different dolphin populations, the extent to which seasonal movements by populations overlapped in space and time, and the populations to which incidentally caught dolphins should be assigned. Because of such difficulties, a final take reduction plan was not adopted by the Service until 2006 (71 Fed. Reg. 24776).

One of the plan's principal mitigation measures was a seasonal ban on nighttime fishing for spiny dogfish, king mackerel, flounder, and sharks with medium-mesh (i.e., a stretch length of 5 x 7 in or 12.7 x1 7.8 cm) gillnets in coastal waters off North Carolina. The nighttime ban was effective from 1 November through 30 April but was established only for a three-year period due to the dynamic nature of the fishery at that time. The provision was extended for an additional three years in 2009. The plan also called for further research to clarify stock structure and movements of animals using photo-identification, telemetry tracking, and genetic studies.

In September 2009 the Service reconvened the team to review results of studies undertaken to sort out bottlenose dolphin stock structure and to monitor bycatch levels. Although further research was still needed, the team was advised that bottlenose dolphins from Florida Bay to New York appeared to be divided into at least nine separate populations centered in various bays and estuaries, plus three resident coastal populations and two migratory populations inhabiting open ocean waters along the coast. The extent to which these populations overlap, however, remains unclear. The team was also advised that bycatch levels appear to have declined but that take from at least one population, the northern North Carolina estuarine population, likely exceeded its PBR level.

The northern North Carolina estuarine population occurs mainly in Pamlico Sound in summer; however, photo-identification data indicate that at least some members of the population move north into the mouth of the Chesapeake Bay in Virginia. Several dozen stranded dolphins have been found dead in the lower Chesapeake Bay in recent years with net marks suggesting entanglement and drowning in a pound net fishery in that area. Therefore, it was believed that reducing takes in that fishery would mitigate bycatch in that population. Pound nets are composed of a rectangular net trap hung between poles set permanently into the bottom sediment. A separate leader net roughly a quarter mile long is then strung along a straight line of vertical poles embedded into the bottom extending out from the center of the trap (Figure VII-3). When fish encounter the leader net, they turn and follow the leader into the trap.

Pound nets also catch significant numbers of endangered sea turtles. To reduce sea turtle bycatch, the National Marine Fisheries Service and the Virginia Marine Resources Commission seasonally limit the height of the leader nets in certain areas of the lower Chesapeake Bay to about three feet instead of extending from the bottom to the surface; this allows turtles to swim over the leader. The take reduction team believed that limiting leader net heights could reduce dolphin bycatch as well and recommended that a similar measure be applied year-round to all

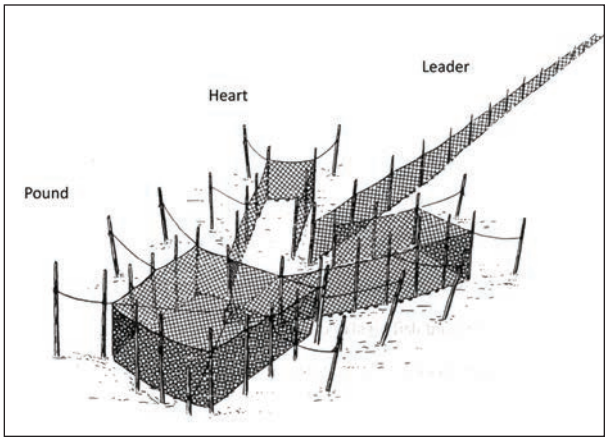

Figure VII-3. Diagram of a pound net (From Silva et al. 2012).

Virginia state waters seaward of the Chesapeake Bay bridge-tunnel. At the team's request, the National Marine Fisheries Service therefore wrote to the Virginia Commission asking it consider (1) the need for consistency between the federal and state rules and (2) adopting the pound net limits more quickly while the Service proceeded to develop its rule under the take reduction plan. The team also recommended that the ban on nighttime fishing with medium-mesh gillnets be extended indefinitely in light of the recent recovery and growth in the spiny dogfish fishery.

In December 2009 the Virginia Commission adopted a new rule for its pound net fishery similar to that recommended by the take reduction team. However, the state's rule did not apply year-round in all the areas recommended by the team. Nevertheless, stranding records involving dolphins with net marks in the lower Chesapeake Bay declined by 65 percent in 2010 and 2011 compared to the two years before the state rule went into effect. In 2010 and 2011 the Service worked on drafting regulations and associated environmental analyses with the intent of publishing a proposed rule consistent with team recommendations in 2011. Progress was interrupted by the *Deepwater Horizon* oil spill in the Gulf of Mexico, but in March 2012 the Service reconvened the bottlenose dolphin team by conference call to update its members on recent developments. During the meeting, the Service noted that the new rules on modified pound net leaders in Virginia were taking longer to complete than anticipated due to possible effects on the regulations to protect endangered sea turtles under the Endangered Species Act. The team was advised that they had to be treated as a separate rulemaking apart from the rules on the nighttime ban and would take longer to complete. As of the end of 2012 the proposed rules on pound net leaders were expected to be published early in 2013.

As a separate matter, however, on 12 April 2012 the Service published a proposed rule (77 Fed. Reg. 21946) to extend indefinitely the nighttime ban on fishing off North Carolina with medium-mesh gillnet. By letter of 1 May 2012 the Marine Mammal Commission wrote to the Service in support of the action, recommending the seasonal ban be made permanent. On 31 July 2012 the Service adopted a final rule (77 Fed. Reg. 45268) making the ban on nighttime fishing permanent from April through November.

With regard to related research activities, the team was informed during the March 2012 conference call that (1) the bottlenose dolphin photo-catalogue was being updated with 4,500 new photos that would help with determinations of population identity; (2) genetic studies would be continued to improve the capability for distinguishing the northern North Carolina estuarine population from coastal migratory populations in an area of overlap along North Carolina's Outer Banks; (3) observer coverage had been increased for the mackerel gillnet fishery off North Carolina because of its possible take of dolphins from several stocks in the area of stock overlap; (4) a study conducted by Duke University of acoustic pingers as a dolphin bycatch mitigation measure in the mackerel gillnet fishery found the devices were ineffective at reducing bottlenose dolphin bycatch; and (5) preliminary analyses of survey data for the northern North Carolina estuarine population produced an estimate of population size of at least 785 dolphins resulting in a PBR of 7.9 dolphins per year.

Gulf of Maine/Mid-Atlantic Harbor Porpoise Take Reduction Team

In 1998 the National Marine Fisheries Service implemented the Harbor Porpoise Take Reduction Plan to reduce the bycatch of Gulf of Maine/Bay of Fundy harbor porpoises in various gillnet fisheries from the U.S.–Canadian border to North Carolina. The plan uses two different strategies in light of differing views among regional fishing communities in New England and mid-Atlantic coastal states as to the ways of reducing harbor porpoise bycatch. In New England, the regulations rely on seasonal closures and requirements for seasonal use of acoustic pingers in other management areas where bycatch levels have been high. These are attached at intervals along gillnet float ropes to alert porpoises to a net's presence. Off mid-Atlantic coastal states, the regulations also use time-area closures, but instead of pingers, they call for a series of gear restrictions (e.g., minimum twine diameter for net webbing, "tie-downs" to limit the vertical height of nets, a maximum num-

ber of nets per boat, and limits on the time nets can be left in the water between hauls) that have lower rates of observed bycatch. After requirements were put in place in both regions, bycatch levels declined below the population's PBR level (calculated to be 483 porpoises per year when the rules were first adopted) and approached, but did not quite reach, the population's zero mortality rate goal (i.e., 10 percent of PBR).

Between 2003 and 2007, however, harbor porpoise bycatch rose and again exceeded the PBR level. Based on fishery observer data collected in 2006, when PBR was calculated to be 610 porpoises per year, the estimated number of harbor porpoises killed or seriously injured in U.S. gillnet fisheries increased to more than 1,000 porpoises, with roughly equal numbers taken off New England and in the mid-Atlantic region (Waring et al. 2009a). In 2007 bycatch declined by half, but the average annual take of 807 porpoises from 2003 to 2007 (the measure used to determine if takes are above or below PBR) was still above the population's PBR (Waring et al. 2009b). The Service therefore reconvened its take reduction team in December 2007. The team was advised that the principal reasons for the increase in bycatch were low levels of compliance with pinger and gear modification requirements and a shift in fishing effort to areas outside the management zones established by the 1998 regulation. To address the increased bycatch, the team reached agreement on changing the plan's regulatory and non-regulatory measures. Most of the recommended changes were included in new regulations proposed to amend the Harbor Porpoise Take Reduction Plan in July 2009 (74 Fed. Reg. 26058) and were adopted by the Service as final rules on 19 February 2010 (75 Fed. Reg. 7383).

Changes in the plan expand the times and boundaries of regulatory management areas in both New England and the mid-Atlantic coastal region and call for increased outreach and enforcement to improve compliance with pinger and gear modification requirements. If bycatch rates as measured by fishery observers continued to be below bycatch rates observed in nets that were in full compliance with requirements, the new rules required that certain consequence closures be implemented in identified times and areas (Figure VII-4). For management areas off the southern coast of New England south of Cape Cod, the bycatch rate for triggering consequence closures in that area was calculated to be 0.023 porpoise per metric ton of fish landed; for areas in the Gulf of Maine off eastern New England, the bycatch rate was 0.031 porpoise per metric ton of fish landings. If those rates were exceeded over two

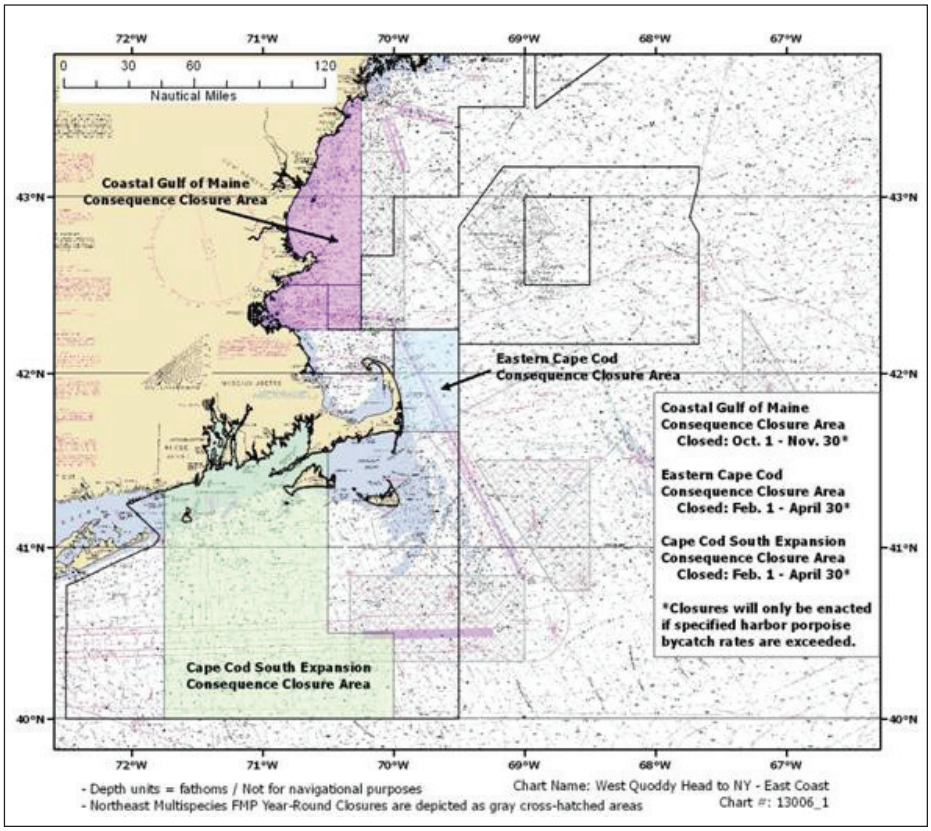

Figure VII-4. Consequence closure areas for the Harbor Porpoise Take Reduction Plan (Source: National Marine Fisheries Service)

consecutive years, consequence closure areas off southern New England, in the Gulf of Maine, or both would go into effect, depending on which trigger rates were exceeded.

Implementation of Consequence Closure Provisions: In the summer 2011 preliminary results from fishery observer data found that the target bycatch rates for triggering consequence closures in both the Gulf of Maine and off southern New England had been exceeded during the first year of the revised take reduction plan measures and that compliance with pinger requirements had continued to be poor. Therefore, on 15 August 2011 the Service wrote to all participants in the fishery advising them that if the rates continued to be exceeded for a second straight year, the consequence closures would go into effect. The agency urged fishermen to comply with all pinger and gear modification requirements.

In April 2012 scientists at the Service's Northeast Fisheries Science Center completed analyses of observer data for the second year under the revised plan (Orphanides and Palka 2012). They concluded that bycatch levels for the Gulf of Maine region were more than twice that region's target rate (i.e., 0.078 vs. 0.031 porpoise deaths and serious injuries per metric ton of landings) and that only 41 percent of observed trips used nets in full compliance with the required number of functioning pingers. Bycatch rates off southern New England, however, fell to half of that region's established target bycatch rate (i.e., 0.012 vs. 0.023 porpoise per metric ton of landings) and compliance rates were somewhat higher (i.e., 65 percent). In view of those findings and the revised regulations, on 19 April 2012 the Service's Northeast Regional Office announced that the coastal Gulf of Maine consequence closure would go into effect on 1 October 2012 and remain closed through the end of November to reduce harbor porpoise bycatch, but that a consequence closure would not be imposed for southern New England. On 26 April, the Service convened the harbor porpoise take reduction team by conference call to explain the basis for the new findings and the steps that were planned for implementing the consequence closure.

Concerned about the persistent and widespread non-compliance with pinger requirements, the Marine Mammal Commission wrote to the Service on 27 June 2012. The Commission expressed support for the recent action and asked for information on the steps taken by the Service to enforce the new rule since February 2010, including–

- the number of gillnets inspected for pinger requirements in various regions
- the number of acoustic detectors available to enforcement agents to test for whether pingers were functioning properly (pinger sounds are above the range of hearing of some people and in any case are difficult to hear above ambient noise on a fishing vessel)
- the number of warnings and citations issued for violations, and
- plans to ensure future compliance with pinger requirements and the impending consequence closure.

The Service responded on 15 August describing cooperative arrangements it had made with the Coast Guard, state enforcement agencies, and its own Office of Law Enforcement to enforce the harbor porpoise rules. It noted that five pinger detectors had been provided to the Coast Guard and enforcement agencies within the states of Maine, Massachusetts, and Rhode Island and that an unspecified number of units had been given to fisheries observers for monitoring purposes not related to enforcement. Answers to the Commission's other questions, however, were deferred, noting that a report on enforcement would be provided to the take reduction team at a meeting planned for the fall of 2012.

On 10 August 2012 the Northeast Seafood Coalition, which was not a member of the Harbor Porpoise Take Reduction Team but represented various New England fishing sectors with gillnetters, wrote to the Northeast Regional Administrator for the Fisheries Service asking that the dates of the consequence closures be changed from October–November 2012 to 15 February–31 March 2013 to minimize the economic impact on Gulf of Maine gillnetters. The letter enclosed an analysis of the economic impact and noted that recent trends in fish catch made October and November far more important to the region's fishermen. In addition, based on its analysis of data documenting when and where harbor porpoises had been taken, it suggested that mid-February through March would provide "expo-

nentially greater protection" for harbor porpoise. To press its request, representatives of the coalition met with the Northeast Regional Administrator on 21 August. They also approached members of U.S congressional delegations for New England states, providing them with copies of the analysis and asking for their support to change effective dates of the scheduled consequence closure. Based on the coalition's analyses, a letter signed by six senators and six members of the House of Representatives was sent to the Acting Assistant Administrator for Fisheries on 6 September 2012 urging the agency to grant timely approval of the request.

The same day the congressional letter was sent, the Service's Northeast Regional Administrator wrote to the coalition providing an analysis of the coalition's request and supporting rationale. The Regional Administrator advised that, after carefully evaluating the coalition's alternative closure dates, the agency found that the new date would provide a negligible conservation gain for harbor porpoises and little economic benefit for fishermen but could have unintended consequences that would jeopardize future management actions for groundfish and other fisheries. The agency's analysis, which was attached to its letter, noted that the coalition's finding of increased protection was based in part on takes that presumably would have not occurred had fishermen been in compliance with pinger requirements and that the coalition's estimate of the economic impact appeared to be inflated by an assumption that fishermen would not shift their fishing effort to other times and areas. The agency also noted that bycatch levels had tracked compliance levels fairly consistently and that the consequence closure strategy had given gillnetters control of their own fate. Accordingly, the Service's Regional Administrator advised that, without compelling evidence of improved harbor porpoise conservation or economic relief, the Service would hold fishermen to the commitments they made when they agreed to the consequence closure approach during the take reduction team meetings and that he could not support changing the dates of the Gulf of Maine closure area.

Concerned that congressional members did not have the benefit of the Service's assessment of the coalition's proposal when they sent their letter of support for changing the closure dates, the Commission wrote to congressional members who had signed the letter, noting that the consequence closure provision had been developed following procedures established by Congress under the Marine Mammal Protection Act. The Commission advised that, if the Service were to act on the coalition's proposal outside of the take reduction team process, it would undermine the good faith needed to make the process work and that team members would lose their incentive to develop mutually agreeable solutions. The Commission therefore noted that Harbor Porpoise Take Reduction Team should consider the coalition's proposal and that it understood the Service would ask the team to review the proposal.

On 26 September 2012, however, the administrator of the Service's Northeast Regional Office announced that he had reversed his decision and, instead of closing the Gulf of Maine consequence closure area for October and November 2012, the area would be closed from 1 February to 31 March 2013 (NOAA Fisheries 2012). The action, made final on 3 October 2012 (77 Fed. Reg. 60319), was made without consulting the take reduction team and was made using a special measures provision in the regulations for the harbor porpoise plan (50 CFR 299.33(f)) that allowed the Service to change closure provisions if it determined the closure would not reduce bycatch below PBR. The notice stated that the change was warranted based on recent information suggesting harbor porpoise bycatch in the closure area is higher in February and March than in October and November and was therefore more protective. No data justifying this conclusion were provided. The notice also stated that the change was only for the 2012 fishing season and that the take reduction team would examine the new information to determine whether the change should be carried forward or changed for future years. In this regard, a team meeting had been scheduled for 29 October–1 November 2012.

Many members of the take reduction team, particularly representatives of the scientific and conservation communities, considered the Service's decision to overturn the team's consensus agreement without consulting the team a breach of good faith by both the fishing industry and the Service. On 4

October, all of the team's scientists and conservation members signed a letter to the Administrator of the National Oceanic and Atmospheric Administration expressing extreme frustration and disappointment at the agency's action. Noting that the decision to change closure dates had been made without any public record of the scientific data or analyses justifying the decision, much less an opportunity for anyone outside the Service to review it, they asserted their belief that the decision failed to follow both the scientific peer review and take reduction team processes and effectively undermined team negotiations and recommendations for this and other take reduction teams.

On 9 November 2012 the Marine Mammal Commission also wrote to the Administrator of NOAA expressing serious concern about the decision, the manner in which it was made, and the ramifications for the take reduction process generally. The Commission noted that the decision appeared to be a fundamental breach of the take reduction process that could undermine the trust needed to negotiate consensus solutions to bycatch problems, not only within the harbor porpoise team, but also other teams, particularly given that many scientists and conservationists on the harbor porpoise team also served on other teams. The Commission also noted that information strongly indicated that the long-standing failure to reduce harbor porpoise bycatch was due to a failure by fishermen to use pingers and a failure by the Service to enforce pinger requirements. The situation therefore raised questions as to the agency's professed commitment for exercising enlightened ocean management and conservation principles. Finally, the Commission noted that the last-minute analyses by the Service short-circuited the due scientific process by bypassing the critical scientific element of review. The Commission therefore noted that it believed that the turn of events relating to the decision warranted an independent review to clarify what happened and to identify corrections for avoiding such situations in the future.

As of the end of 2012 the Commission expected to receive a reply to its letter in early 2013.

2012 Harbor Porpoise Take Reduction Team Meeting: On 23 October, scientists on the team, having received no reply to their 4 October letter, advised the Service that they did not plan to participate in the 29 October–1 November take reduction team meeting. They cited four reasons for the decision: (1) they had lost faith in the gillnet fishery's commitment to use pingers and the Service's commitment to enforce requirements for their use; (2) based on observer data that the Service chose not to use when evaluating bycatch rates, they believed closures were warranted off southern New England as well as in the Gulf of Maine; (3) given the Service's abrupt change in position between 6 September when it stated a careful review indicated no change in closure dates was warranted and 26 September when it decided the change was justified, it appeared that the Service had "cherry-picked" data to support a political decision; and (4) given that bycatch levels had been above PBR for six of the past seven years, it seemed evident that the plan was not working and the Service was not committed to aggressive conservation measures needed to resolve the bycatch issue. On 24 October one of the team's scientists—an individual who had been on the team since its inception and who had worked with fishermen to develop the pinger technology 15 years earlier—resigned from the team, stating that based on the Service's action, it appeared the agency no longer valued careful, peer-reviewed scientific analyses or the take reduction team process. A week before the team was scheduled to meet the meeting was postponed due to Hurricane Sandy. It was later rescheduled for 27–30 November 2012.

Only half the team members attended its November meeting. No team scientist participated for reasons noted in their 26 October letter. In addition, no representatives of mid-Atlantic fisheries attended, in part because they were still dealing with hurricane damage. As a result, discussions at the meeting focused almost entirely on issues related to New England.

During the meeting, Service scientists presented information used to justify the change in the Gulf of Maine consequence closure dates. They noted that harbor porpoise bycatch estimates in the closure area had decreased significantly in the fall months compared to the late winter since the plan was implemented in the late 1990s. From 2010 when the current rules went into place through March 2012, an esti-

mated 56 porpoises were caught in the closure area during the February and March period compared to 43 porpoises in October and November. Although bycatch numbers vary from year to year and the Service assumed that no fishing effort prohibited during closures dates would shift to other times or areas, the Service considered the difference of 13 porpoises sufficient to justify changing the closure dates pursuant to its rules.

Participants also reviewed new compliance data from the fishery observer program. The data indicated that compliance with requirements for using pingers had improved. Whereas an overall average of 57 percent of observed hauls requiring pingers had the correct number of devices between 2007 and 2012, this increased to an average of 67 percent between 2010 and 2012. Observers also found that a few vessels repeatedly failed to use pingers and that 50 percent of the vessels had at least one of their hauls equipped with less than 50 percent of the required number of pingers. Due to longstanding problems with equipment needed to test whether pingers were working, observers had been unable to collect sufficient data for meaningful analyses of the proportion of deployed pingers that were functioning properly. The team was advised that problems with pinger testers had been resolved and that the collection of these data would be conducted in the future. Overall compliance rates were also poor with gear modification requirements in the mid-Atlantic region, but most of the non-compliant vessels and porpoise bycatch in the region involved boats based in New England that traveled south to fish for monkfish and dogfish, rather than boats based in mid-Atlantic ports.

Pinger functionality has been an important concern relative to compliance. Because pingers are difficult to hear, especially at sea on a noisy vessel, it is difficult for fishermen to determine when batteries need to be changed. At least one pinger manufacturer therefore has begun incorporating LED lights on new pingers that flash for a brief period when they are removed from the water to indicate that they are working. This provides a visual signal to let fishermen know when batteries need to be replaced. The team was advised that some fishing organizations had purchased more than 2,000 new LED pingers for their gillnet fishermen.

Although enforcement has been a longstanding concern for the team, given low compliance rates, reports provided to the team indicated that little had been done to increase enforcement. Despite poor levels of compliance detected by observers, the team was advised that state enforcement officers, who carry out most of the work to enforce the harbor porpoise plan, had found no violations since the new harbor porpoise rules were adopted in 2010 and the Service's Office of Law Enforcement had issued no violations over that period. The Coast Guard reported one violation in New England for failing to have a sufficient number of pingers and failing to report a porpoise caught the net, but it was unclear what, if any, action was taken to prosecute the violation.

Following these and other updates on background information, participants in the meeting discussed ways of strengthening enforcement, improving compliance, altering the existing consequence closures and triggers, and changing the regulatory provision that authorizes the Service to change agreed rules at the last minute without consulting the team. No consensus recommendations were reached on any of those issues. Representatives of the fishing industry and conservation groups then offered two general proposals. Industry representatives proposed adjustments to existing fishery closures and shifting responsibility for ensuring pinger usage to managers of fishing "sectors" (groups of fishermen with an assigned share of the catch quota for groundfish in New England). Conservationists proposed expanding the number, geographic range, and effective dates of fishing closures. No agreement was reached on either proposal. To move discussions forward, members were invited to submit more specific proposals early in 2013 for consideration at subsequent take reduction team meeting.

As of the end of 2012 members of the team had not yet developed any further changes to be made to the take reduction plan.

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 also have increased, especially on the U.S. West Coast. The most acute concerns have focused on the impact of sea lion predation on reduced or declining salmonid stocks, many of which are listed as threatened or endangered and which are particularly susceptible to predation at dams and other impediments that slow their migrations. 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.

Initial Issuance of a Lethal Taking Authorization

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 (*Zalophus californianus*) 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 Species Act.

Beginning in 2005 the Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, and others have used non-lethal methods at Bonneville Dam in an effort to exclude sea lions from fish passageways and deter pinnipeds from eating salmonids. Those efforts have had only limited success, and the states and involved federal agencies have concluded that non-lethal alternatives, by themselves, are insufficient to reduce California sea lion numbers and predation rates at the dam.

After concluding that predation by pinnipeds was having a significant negative impact on the decline and recovery of endangered and threatened Columbia River salmonid stocks, the states of Washington, Oregon, and Idaho submitted an application in December 2006 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. They sought authority to remove by lethal means up to 1 percent of the PBR level for California sea lions (about 85 animals per year at the time) between 1 January and 30 June for an unspecified number of years. They also sought authority to remove any California sea lion seen above a navigation marker 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.

After convening and seeking the advice of a pinniped-fishery interaction task force, the National Marine Fisheries Service in March 2008 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 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 under that authorization had to be individually distinguishable either by unique natural markings or applied features such as brands

and meet one of the following criteria to be 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. 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 PBR 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 determined 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 powerhouses or the concrete apron below the dam.

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 to conduct a review of whether the predation rate on salmonids had decreased to below 1 percent of the observed fish passage at the dam. If so, lethal removals would not be authorized in the following year. However, because of a lawsuit challenging the authorization, no pinnipeds were intentionally killed at the dam in 2008. Seven sea lions listed as eligible for removal were captured for placement at public display facilities, one of which died while under anesthesia during health screening. In addition, six other animals (four California sea lions and two Steller sea lions [*Eumetopias jubatus*]) died after having been trapped unintentionally, likely related to organ failure associated with stress and heat prostration. 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 accidents 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. The parties entered into an agreement delaying any lethal removals so that the court would have time to consider the plaintiffs' motion for a preliminary injunction. In the meantime, the states were allowed to trap, mark, and relocate sea lions.

On 16 April 2008 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.

On 25 November 2008 the district court issued its opinion on the merits of the case, finding in favor of the federal and state agencies named as defendants.

Among other things, the plaintiffs had contended that the take of salmonids by pinnipeds near Bonneville Dam is much smaller than takes from other sources (e.g., fisheries and hydropower operations) 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.

Subsequently, 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.

The appellate court issued its ruling on 23 November 2010 (*Humane Society* v. *Locke* 626 F.3d 1040 (9th Cir. 2010)). 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 fishery harvest plans having greater mortality impacts." 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 a significant versus an insignificant impact on salmonids and why a predation rate of 1 percent would no longer constitute a "significant negative impact" to fish stocks. In weighing the case, the appellate court cited comments submitted by the Marine Mammal Commission 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 therefore reversed the district court's ruling on the 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.

2011 Authorization

Just before the appellate court issued its ruling vacating the 2008 authorization, the Service reconvened the pinniped-fishery interaction task force to review the implementation and effectiveness of the authorized pinniped management efforts. 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, (2) non-lethal hazing techniques remain effective in reducing predation and if they should be modified or supplemented in any way, (3) current criteria 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, in a 17 December 2010 report, found that the removal program (hazing, identifying, trapping, and removing specific sea lions) had yet to be implemented fully and, as such, had failed to achieve 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 also believed that the goal of reducing predation to below

1 percent should not be changed because 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 taking into consideration the task force's 2010 report and 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 Service 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 Service's 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 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, although one sea lion had been euthanized before that agreement was reached. 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 lethal removal of sea lions at the dam would not be authorized until the following spring and invited the states to submit a new application for action before the end of February 2012.

2012 Authorization

On 22 August 2011 Washington, 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 again recommended that the Service devise a quantitative standard to relate specific pinniped consumption rates to the population-level impact on the affected fish stocks, which would provide the Service with a stronger rationale for finding that certain predation levels increase 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 targeting the largest contributors to the fish predation problem. Finally, the Commission expressed ongoing concern 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, suggesting 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 who 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 being removed are simply being replaced by new animals.

The Service again found that certain individually identifiable pinnipeds are having a significant negative impact on the decline or recovery of several stocks of salmon and steelhead listed as threatened or endangered and issued a new five-year lethal taking authorization to the states on 15 March 2012. The criteria for identifying which California sea lions are eligible for removal remained the same as under the 2008 authorization. The Service appended to the authorization a list of 130 California sea lions that had been identified as having met those criteria, 38 of which had already been euthanized, had died during trapping or handling, or had been transferred to public display facilities. Much of the analysis supporting the issuance of the new authorization was included in the Service's "Report on Consideration of Statutory Factors under Section 120 of the MMPA." That report, among other things, sought to differentiate the significance finding under section 120 from findings of no significance that it had made under the National Environmental Policy Act and from taking authorizations issued for other activities (e.g., fisheries). The Service also explained its rationale for eliminating the 1 percent predation rate threshold as a measure of significance and instead indicated its intent to assess predation over the five-year period of the authorization to determine whether there has been a declining trend from year to year in the numbers of salmonids being eaten by California sea lions.

As with the previous authorizations, the Humane Society of the United States filed a lawsuit challenging the 2012 letter of authorization. It also sought to have the lethal removal of sea lions stopped until the case could be resolved. However, the district court denied a motion for a temporary restraining order on 22 March 2012 and a motion for a preliminary injunction on 30 May 2012. The Ninth Circuit Court of Appeals also declined to issue an injunction, thereby allowing sea lions to be euthanized pending the outcome in the case. A ruling had yet to be issued at the end of 2012.

Activities in 2012

Each year, the states of Oregon and Washington and the Army Corps of Engineers report on their activities related addressing pinniped predation at Bonneville Dam. The 2012 report submitted by Oregon and Washington discussed the effectiveness of their non-lethal 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. The states discontinued the use of acoustic deterrence devices because tests conducted between 2006 and 2010 showed them to be ineffective in the noisy conditions that exist near the fishway entrances.

In 2012 the states captured 17 individual California sea lions at Bonneville Dam. Of these, 6 were branded and released, 1 was relocated to a public display facility, and 11 were euthanized. One additional sea lion identified for removal was trapped later in the year at Astoria (near the mouth of the Columbia River) and euthanized. (Brown et al. 2012).

The states also captured 20 Steller sea lions, 1 of which previously had been branded. The other 19 animals were branded and all were released. Of these, most remained in the vicinity of the dam; however, a few were not spotted at the dam again, including two individuals that were later tracked to Alaska.

The field report prepared by the Army Corps of Engineers (Stansell et al. 2012) provided (1) observations of the seasonal timing and abundance of pinnipeds at Bonneville Dam, (2) estimates of the numbers of salmonids, white sturgeon, Pacific lamprey, and other fish consumed by pinnipeds at the dam, (3) the effectiveness of pinniped deterrents and barriers, and (4) the impact of states' removal efforts on pinniped numbers and predation levels. Pinniped presence at Bonneville Dam peaked in 2010, with 166 different individuals observed. This number dropped to 144 in 2011 and 112 in 2012. Most of this drop is attributable to a decline in the numbers of California sea lions observed (see Table VII-2). The number of individual California sea lions dropped from 89 in 2010 to 39 in 2012, the lowest number reported since 2002 when observations at the dam began. The recent trend of California sea lions being replaced by Steller sea lions continued in 2012. Although the number of Steller sea lions declined somewhat between 2011 and 2012, for the second year in a row they outnumbered the California sea lions observed at the dam. In addition, both the maximum and the mean numbers of pinnipeds present on a given day have declined since they peaked in 2010 (see Figure VII-5).

There also have been shifts in the numbers of new California sea lions showing up at the dam. In 2010 observers identified more new sea lions than returning ones, raising the fear that new animals were simply replacing those that were removed under the Marine Mammal Protection Act authorization. However, in 2011 and 2012 only about 35 percent of identifiable animals were new additions.

The Corps of Engineers estimates the numbers of fish consumed in the waters below Bonneville Dam based on observations and extrapolation to account for nighttime predation and to apportion

Table VII-2. Minimum estimated number of individual pinnipeds observed at Bonneville Dam from 2002 to 2012. (CSL = California sea lion; SSL = Steller sea lion)

Year	CSL	SSL	Harbor seals	Total pinnipeds
2002	30	0	1	31
2003	104	3	2	109
2004	99	3	2	104
2005*	81	4	1	86
2006	72	11	3	86
2007	71	9	2	82
2008	82	39	2	123
2009	54	26	2	82
2010	89	75	2	166
2011	54	89	1	144
2012	39	73	0	112

* Regular observations did not begin until March 18 in 2005.

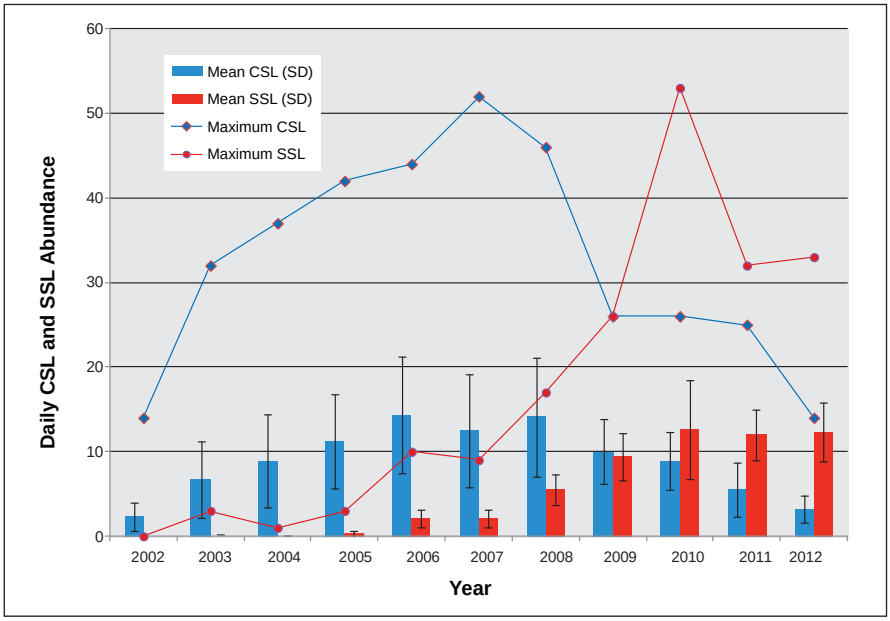

Figure VII-5. Mean, standard deviation, and maximum daily estimated number of California sea lions (CSL) and Steller sea lions (SSL) present at Bonneville Dam between January 1 and May 31, 2002 to 2012.

unidentified prey species. Between 6 January and 31 May 2012, the Corps and its partners conducted more than 3,400 hours of daytime observations. The adjusted estimated consumption of adult salmonids in 2012 was 2,360, which was about 1.4 percent of the estimated run. As shown in Table VII-3, the number of salmonids consumed by pinnipeds at the dam increased each year between 2005 and 2010 but declined in 2011 and again in 2012. For the first time, in 2012 predation of salmonids by Steller sea lions exceeded that by California sea lions (Figure VII-6). Predation attributed to California sea lions accounted for 1,067 salmonids (46.7 percent of the observed catches) or about 0.6 percent of the run size.

The shift in the relative occurrence of California and Steller sea lions at Bonneville Dam and the larger proportion of salmonid predation attributed to Steller sea lions have raised concerns that limiting removals to California sea lions will not effectively address the 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 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 II.

Also, unlike California sea lions, Steller sea lions also present predation risks on fall salmonid runs. Between 1 October and 31 December 2011 only one California sea lion was observed at the dam and then only on a single day. In contrast, at least 11 different Steller sea lions were observed at the dam during this period and for longer periods. These Steller sea lions feed primarily on white sturgeon (45 percent of observed catches) but also eat salmonids (28 percent).

Since 2008, 54 California sea lions have been euthanized, transferred to zoos and aquaria, or died during trapping under the removal program. Opinions differ as to whether the recent decline in the presence of California sea lions at the dam and the reduced predation of salmonids are attributable to the pinniped removal program. The states estimate that for every California sea lion removed under their autho-

Table VII-3. Consumption of salmonids by California sea lions, Steller sea lions, and harbor seals at Bonneville Dam tailrace, from surface observations conducted between 2002 and 2012. Total salmonid passage counts include all adult salmonids that passed Bonneville Dam from January 1 through May 31.

		Expanded Salmonid Consumption Estimate		Adjusted Salmonid consumption Estimate	
Year	Bonneville Dam Salmonid Passage (Jan. 1–May 31)	Estimated Consumption	% of Run (Jan. 1– May 31)	Estimated Consumption	% of Run (Jan. 1– May 31)
2002	284,732	1,010	0.4 %	N/A	N/A
2003	217,934	2,329	1.1 %	N/A	N/A
2004	186,771	3,533	1.9 %	N/A	N/A
2005	81,252	2,920	3.4 %	N/A	N/A
2006	105,063	3,023	2.8 %	3,401	3.1 %
2007	88,474	3,859	4.2 %	4,355	4.7 %
2008	147,558	4,466	2.9 %	4,927	3.2 %
2009	186,056	4,489	2.4 %	4,960	2.7 %
2010	267,167	6,081	2.2 %	6,321	2.4 %
2011	223,380	3,557	1.6 %	3,970	1.8%
2012	171,665	2,107	1.2 %	2,360	1.4%

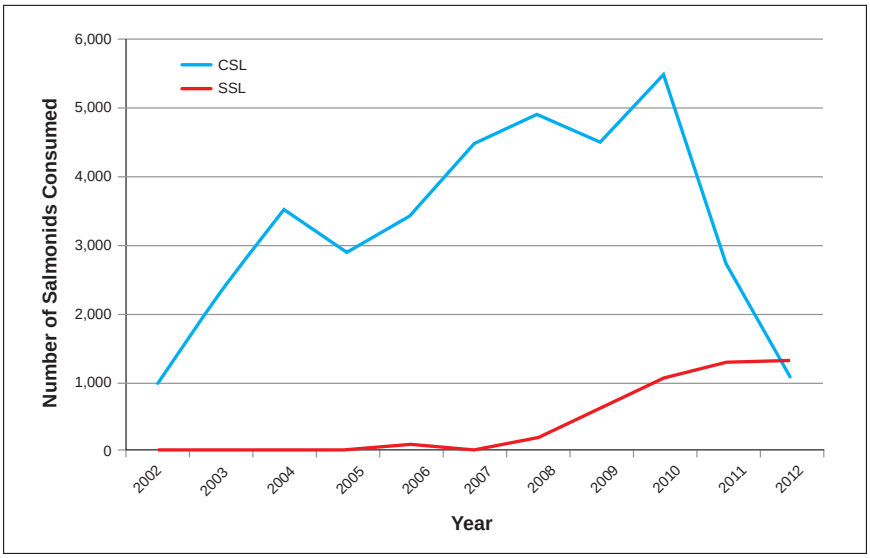

Figure VII-6. Salmonid consumption estimates adjusted for "unknown" and nighttime predation by California sea lions and Steller sea lions at Bonneville Dam, 2002–2012.

rization, salmon escapement at the dam increases by 57 fish (Brown et al. 2012). Moreover, because the same sea lions tend to show up at the dam year after year, these increases in fish escapement are cumulative. In addition, the states have speculated that naïve animals follow habituated sea lions to the dam so that removing experienced animals should also reduce the number of new recruits. However, other factors besides removals may be at play in the recent declines in California sea lions at the dam and in the predation of salmonids. In particular, the role that Steller sea lions have played in displacing California sea lions is not well understood. One theory attributes the influx of a large number of new California sea lions appearing at the dam in 2010 to an El Niño event (Stansell et al. 2011) and movement of more animals into the northern portion of their range, but the causes of that influx are not well understood. It is possible that similar episodes could recur and that predation of salmonids at the dam by California sea lions could increase in future years.

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 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 PBR level of California sea lions on the Columbia River or its tributaries. Similar bills have been introduced in subsequent sessions of Congress.

On 29 September 2012 five congressmen from the Pacific Northwest introduced H.R. 3069, the Endangered Salmon and Fisheries Predation Prevention Act. The bill would authorize the National Marine Fisheries 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. The bill identified as potential permit holders the states of Washington, Oregon, and Idaho, 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.

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 non-lethal measures have not been effective. Unlike earlier bills, H.R. 3069 did not specify that lethal take authority applies only to California sea lions and instead would allow the Secretary to authorize lethal removal of "sea lions that are part of a healthy population that is not listed as an endan-

gered species or threatened species under the Endangered Species Act of 1973." In light of the pending proposal to delist the eastern stock of Steller sea lions (see Chapter II), this difference could be important.

The provisions of H.R. 3069 were passed by the House of Representatives on 19 June 2012 as part of H.R. 2578, a consolidated package of 14 natural resources bills. However, the Senate did not take up the bill before the end of the 112th Congress, and it was not enacted. It is expected that similar legislation will be introduced in 2013.

Alaska Observer Program

The National Marine Fisheries Service administers observer programs in each of its six management regions that are responsible for collecting data on catch, bycatch, and fishing operations and limited information on compliance with regulations. Those programs are conducted under the authority of mandates in the Magnuson–Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act. Under the Magnuson–Stevens Act, the Service and the regional fishery management councils can require fishing vessels to carry observers to collect data "necessary for the conservation and management of [a] fishery."[6] Under the Marine Mammal Protection Act, the Service may place observers on vessels that are part of fisheries that frequently or occasionally[7] take marine mammals[8], or where take contributes to an "immediate and significant adverse impact" on threatened or endangered species, in order to assess fisheries impacts on marine mammals and evaluate mitigation measures.[9] Under the Endangered Species Act, section 7 biological opinions may recommend or require the placement of observers in fisheries that are likely to "jeopardize the continued existence of endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat of such species."[10]

The types of data collected by observers generally are not dependent on which act provides the authority to observe a fishery. Observers typically collect a wide range of data that include information on the catch, bycatch, vessel, gear, fishing effort and methods, and environmental conditions. The Service believes that "[o]bserver data are considered the most reliable source of information on bycatch, since the observers are independent and able to monitor bycatch directly" (NPFMC/NMFS/AFSC 2011). Nonetheless, the data can be biased or insufficiently precise, which means that practical observer program improvements that minimize bias and improve precision are desirable.

Managers, scientists, and enforcement agents use observer data for assessing stock status, monitoring fishery quotas, monitoring bycatch in fisheries, and assessing the fishery's impact on living marine resources. Such information also is useful for characterizing the nature of interactions between fisheries and protected species, using that information to reduce the bycatch of protected species, and monitoring the effectiveness of mitigation measures. The extent to which observer programs provide reliable data depends, in part, on whether the deployment of observers on vessels and fishing trips (i.e., the coverage) provides a statistically representative sampling of fishing effort that produces unbiased and acceptably precise estimates of catch and bycatch. Observer programs can produce unbiased estimates of catch and bycatch with less than 100 percent coverage if they are based on representative catch and/or bycatch samples and/or some validated means of correcting sample biases. Obtaining such samples and developing such corrections are difficult because catch and bycatch, and their estimates, are affected by vessel characteristics, where and how they fish, which fishery sectors and vessels are sampled and how they are chosen, and the "observer effect" — fishermen sometimes altering practices when accompanied by observers (NPFMC/NMFS/AFSC 2011).

The Alaska Groundfish Observer Program was implemented in 1989 with the goal to "provide accurate [unbiased] and precise catch, bycatch, and biological information for conservation and management of groundfish resources and the protection of marine mammals, seabirds, and protected species" NPFMC/NMFS/AFSC 2011). Coverage levels were based on vessel length or processing volume, with a few

6 16 U.S.C. §1853 (b)(8)
7 Category I or II fisheries, respectively
8 50 CFR 229.7(b)
9 50 CFR 229.7(d)(i)
10 ESA Sec. 7(a)(2)

exceptions. Groundfish vessels longer than 125 ft were required to have an observer onboard at all times when actively fishing, and vessels between 60 and 125 ft were required to carry observers at least 30 percent of the time while fishing. Vessels less than 60 ft and all vessels fishing for halibut were exempt from the program. In addition, vessel owners/operators contracted directly with observer providers and were able to choose when to take observers and, to a certain extent, which observers to take. The system created potential conflicts of interest and left managers little opportunity to direct the distribution of coverage over time and area. As a result of these factors, the coverage was neither representative of the distribution of fishing effort among sectors of the fisheries nor the spatio-temporal distribution of fishing effort in the fishery. Therefore, catch and bycatch data almost certainly were biased because the program did not representatively sample the fishery, although the magnitude and significance of the biases were not clear. Further, because the program imposed observer costs based on vessel size, it created economic incentives to minimize participation through tactics such as modifying or building vessels to fit just under the 60-ft or 125-ft cutoffs, further adding to the potential bias (NPFMC/NMFS/AFSC 2011).

To address these problems, which had long been recognized by the Service (Inspector General's Office, U.S. Department of Commerce 2004) and the North Pacific Fishery Management Council, the Service proposed in April 2012 to amend two Alaska fishery management plans to modify the deployment system for observer coverage to reduce the bias in catch and bycatch estimates while achieving a desired level of precision (77 Fed. Reg. 23326). The Service proposed three fundamental changes to the program. First, almost all groundfish and halibut vessels and processors would be included in the program. Vessels would be placed in one of two categories—full or partial coverage—based on data needs for each program objective rather than on vessel size or processor volume. Second, the program would implement a new fee plan to fund observer programs that would be more equitable across the various sectors of the fishery. Third, the Service would control deployment of observers on vessels in the partial coverage category by contracting directly with observer providers. Vessels in the full-coverage category would retain control over which observer providers, and possibly which observers, they would use. The Service would eliminate fixed coverage rates and instead would include a vessel and trip selection system designed to randomize observer deployment and minimize the chances that operators could avoid participation while accommodating the logistical difficulties associated with deploying observers on small vessels. As stated in the proposed rule, "The restructured Observer Program would require NMFS to efficiently allocate observer effort towards multiple objectives, such as estimating catch, bycatch, and protected species interactions, within the budget generated by ex-vessel value-based fee proceeds."

The Commission expressed its support for the proposed rule and offered a number of recommendations crafted to improve the proposed changes to the observer program. Those recommendations and the Service's responses to them, which were published along with the final rule notice in November 2012 (77 Fed. Reg. 70061), are described below. The final rule did not differ significantly from the proposed rule.

The Commission recognized that the proposed changes would not eliminate all sources of bias or uncertainty regarding the precision of protected species bycatch estimates. For example, having the Service contract directly with observer providers and control the deployment of observers in the partial-coverage category of the fishery should largely eliminate the potential conflict of interest between vessel owners/operators and observer providers. Nonetheless, this potential still existed in the full-coverage category because owners/operators would still select their observer providers and possibly affect the selection of the particular observers assigned to their vessels. To address this concern, the Commission recommended that the Service work with the North Pacific Fishery Management Council to give the Service control of observer deployment in both the partial and full-coverage categories. The Service agreed that sources of bias would still exist in the modified program, but deployment in the full-coverage category would not be a significant source of bias because (1) because providers were prohibited from responding to industry requests for specific

observers and (2) it believed that the providers were in compliance with this requirement.

Despite the goal that the restructured program include all vessels, it would not, at least in its early years, assign observers to vessels that use jig gear or catcher vessels less than 40 ft in length that use pot or hook-and-line gear. The Service apparently had not made coverage of these vessels a priority because the placement of observers on small vessels can be difficult and/or because these vessels account for very little of the total groundfish catch. Although the Service's analysis of the proposed rule found that small vessels had accounted for only 9.2 percent of the total groundfish catch, it also found that they accounted for 41 percent of the trips. Therefore, the Commission recommended that the Service develop and implement a method to estimate reliably the bias in estimates of protected species bycatch that would result from not observing the exempted vessels and gear types. The Service agreed that understanding to what extent excluding certain vessels would bias bycatch estimates was important but pointed out that the proposed rule, being limited to funding and deployment, did not address estimation methods. Nonetheless, the Service indicated that it would be adapting the deployment model over time as it learns more about the source and magnitude of biases.

The Commission acknowledged that placing observers on small vessels is particularly challenging, given space limitations and safety concerns. The proposed rule suggested that vessels in this size class might be observed in future years but provided no details on how this might be accomplished other than through the deployment of electronic monitors instead of observers. The Commission recommended that the Service develop an implementation plan for electronic monitoring on groundfish vessels, including (1) a means for assessing both those protected species that are brought on board and those that are not and (2) a means for analyzing the effectiveness of the electronic monitoring at identifying the species, estimating the numbers, and characterizing the severity of injuries to protected species, whether or not they are brought on board. The Service argued that several factors make monitoring protected species interactions particularly difficult, especially the rarity of protected species interactions because large sample sizes of electronic monitoring data are required to effectively estimate bycatch rates. The Service also expressed concern that it would be difficult to place video monitors such that they could detect and identify all bycatch. The Service did state that protected species interactions will be one of the objectives of electronic monitoring of these fisheries.

The original program included a coverage target of 30 percent for the partial-coverage sector (vessels 60 to 125 ft long). Although the proposed changes were intended to substantially reduce the bias in catch and bycatch estimates, the restructured program contained no such coverage target. The Service's analysis of the proposed rule described the statistical approach and model that was used to examine the current allocation of observer effort (NPFMC/NMFS/AFSC 2011). However, the proposed plan did not indicate whether that approach or model would be used by the restructured program to allocate observer effort according to specified standards or targets. The lack of targets or performance standards made the impact of the changes on the precision of those estimates uncertain and called into question whether the program would be able to maintain its accuracy in the face of substantial decreases in the size of the fishery or increases in the cost of deploying observers. The Service acknowledged that the efficiency of the observer program could not be maximized simultaneously with respect to all of its objectives. For example, the variance in different sampling strata could be used to maximize the precision of a catch estimate, but there would be no guarantee that it would produce acceptably precise estimates of other measures, such as the bycatch of protected species. Accordingly, in its analysis of the options for implementing the rule, the Service recommended the use of performance standards such as a specific coefficient of variation (CV) for the catch or bycatch estimate or a specific coverage rate. However, it appeared in the end that the Service and Council settled upon a minimum, least conservative coverage target that would be achievable under the funding model but which would not necessarily ensure adequate precision of catch and bycatch estimates across the fishery (NMFS 2004a). In accordance with the recommendations of the Service's 2004 workshop on observer coverage levels (NMFS 2004b), the Commission

recommended that the Service (1) establish coverage performance standards based on desired strata variances (CVs), rather than on potentially inadequate, budget-driven, one-size-fits-all coverage prescriptions, and/or (2) modify the proposed rule to include precision targets (e.g., CV = 30 percent) for estimates of protected species bycatch so that the precision of these estimates would not fall to unacceptable levels while the program sought to maximize the accuracy of catch estimates. Responding to these two recommendations, the Service agreed that performance standards "represent an important and necessary step towards a fully optimized deployment of observers and [are] an appropriate goal." However, again the Service pointed out that such aspects of the observer program were not included in the proposed amendment. The Service assured the Commission that data collected by the restructured observer program would enable the Service to develop performance standards and modify the deployment plan to improve the optimization of the observer program.

The restructured program was slated for implementation on 1 January 2013, and therefore no data on its early performance were available as of the end of 2012.

Data Confidentiality

Section 403(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act authorizes the National Marine Fisheries Service to make public any information submitted in compliance with any of its requirements "in any aggregate or summary form which does not directly or indirectly disclose the identity or *business of any person* who submits such information" (emphasis added). On 23 May 2012 the Service proposed to revise its regulations governing confidentiality of information submitted under the Magnuson–Stevens Fishery Conservation and Management Reauthorization Act.[11]

Among other things, the proposed rule would add a definition for "business of any person." The new definition would expand withheld information to include not only the identity and names of individual businesses but also certain operational characteristics of individual businesses, such as when and where they fish, the type of gear used, the species caught, and the size of the catch.

Although some information submitted by fishery observers could be considered operational, the Service proposed to exclude certain observer information related to the incidental catch of protected species from the definition of "business of any person." To support this exclusion, the Service noted that at times information on individual interactions with protected species is necessary to meet the requirements of the Marine Mammal Protection Act or the Endangered Species Act. As examples, the Service noted the importance of such information for developing measures to minimize incidental take of marine mammals in fisheries and for developing reasonable and prudent alternatives in section 7 consultations under the Endangered Species Act.

On 25 June 2012 the Commission provided recommendations to the Service regarding the proposed rule. The Commission expressed its appreciation of the Service's efforts to make fishery observer information publicly available and to meet the requirements of the Marine Mammal Protection Act and the Endangered Species Act. The Commission suggested that requests for data normally would not require revealing the operational characteristics of a particular individual business. Nonetheless, the Commission argued that the national interest generally would be better served by making that information available. The Commission expressed its position that full disclosure regarding interactions with protected species is an appropriate and reasonable requirement in exchange for the privilege of commercially exploiting a public resource.

The Service proposed to exclude from the definition of "business of any person" the following protected species information collected by observers: "the species of each marine mammal or ESA-listed species incidentally killed or injured; the date, time, and geographic location of the take; and information regarding gear used in the take that would not constitute a trade secret under FOIA, 5 U.S.C. 552(b)(4)".[12] The Commission supported the exclusion of

[11] 76 Fed. Reg. 30486

[12] 76 Fed. Reg. 30492 76 Fed. Reg. 30486
76 Fed. Reg. 30492

this information but considered the listed information to be too narrow. The Commission noted that other protected species statutes, such as the Migratory Bird Treaty Act and various state endangered species laws, also may require public release of information on interactions of other protected species with fisheries. The proposed definition, however, appears to address for unstated reasons only those species receiving protection under the Marine Mammal Protection Act and Endangered Species Act.

In addition, the Commission reminded the Service that other types of information collected by observers are in some situations essential to assessing and mitigating fishery interactions. Examples include the type of bait; photographs, videos, or other information indicating how an animal was caught or injured during fishing; efforts related to handling or release of the animal; the types of tissue samples collected from an animal; comments by the observer or vessel captain describing events related to an incidental take; the catch of other target and other nontarget species in the same haul as the take; or how the gear was set, tended, or hauled. The Commission argued that the Service should exclude from the definition of "business of any person" any scientific or management information that (1) is collected by observers or provided to them in the course of their official duties and (2) may help in understanding and mitigating fishery interactions with protected species.

Based on these considerations, the Commission recommended that the Service adopt the proposed rule but exclude from the definition of "business of any person" information that is collected by observers as part of their official duties and that is necessary to (1) protect and conserve species in accordance with the requirements of the Marine Mammal Protection Act and the Endangered Species Act, (2) protect and conserve species in accordance with other federal and state statutes passed to promote conservation of protected species, and (3) describe or understand how protected species are caught incidentally or how to avoid such takes.

A wide variety of organizations and individuals from the fishing industry, conservation community, and a fishery observer association submitted comments on the proposed rule.[13] Comments ranged from complete support of the changes to recommendations that the proposed rule be withdrawn until a number of critical issues could be resolved. Fishing groups supported the principle of keeping most or all of what they view as proprietary information confidential so as to protect their business interests. Nonetheless, some also recognized the importance of such data to effective fisheries management and industry participation/innovation and supported making those data available to fishery managers and scientists. At least two groups stated their belief that protected species data should not be treated differently. The observer association and conservation groups were united in their opposition to restricting the availability of information to the public regarding the use of a public resource and in their belief that access is necessary for the public to be able to assess the impact of fishing on public resources, protected species and marine ecosystems, and to contribute to the proper management of marine fisheries and protected species.

As of the end of 2012 the Service had neither finalized the rule nor responded to the Commission's recommendations.

U.S. Seafood Imports

The total value of U.S. imports of edible seafood has increased nearly fourfold over the past two decades, reflecting the growing demand for seafood in the United States. Seafood imports fuel major economic activity in the United States, contributing 176,000 jobs, $48.4 billion in sales impacts (direct, indirect, and induced), and $14.8 billion in value-added impacts in 2011 (NMFS Fisheries Economics of the U.S. 2012). As the third largest market in the world, U.S. demand provides a market for fish harvested by foreign fleets, which in certain cases raises concerns about the impact of the U.S. appetite for seafood on the marine ecosystem. As the Commission noted in its comments to the Service regarding the rulemak-

[13] http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;D=NOAA-NMFS-2012-0030;dct=PS

ing on seafood imports (see section below), fisheries bycatch has been identified as the leading human-related cause of marine mammal mortality worldwide, underscoring the compelling need to reduce such mortality in foreign fisheries

In 2012 U.S. imports of edible seafood products totaled 2.4 billion pounds valued at $16.7 billion (NMFS Office of Science and Technology website data). Non-edible seafood product imports were valued at $14.4 billion, bringing total imports to $31.1 billion. The top three edible seafood imports by product were shrimp ($4.5 billion or 27 percent of edible imports), fresh and frozen salmon ($1.9 billion or 11 percent), and fresh and frozen tuna ($1.1 billion or 7 percent, an increase of nearly 50 percent over the previous year). Total seafood exports for edible products in 2012 was $5.1 billion (U.S. origin seafood), bringing the trade deficit for edible seafood (difference between imports and exports) to $11.6 billion. The overall deficit including non-edible products is nearly $9 billion. The top countries of origin for edible seafood imports in 2012 were China ($2.7 billion), Canada ($2.5 billion), and Thailand ($2 billion); these three countries supplied more than 40 percent by value of total imports. The three major countries to which the United States exported seafood were Canada and China ($1.1 billion each) and Japan ($0.76 billion).

In contrast, the amount of all commercially landed edible fish and shellfish in the United States in 2012 was 9.7 billion pounds valued at $5.1 billion (NMFS Office of Science and Technology website data).

Marine Mammal Protection Act Import Rule

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 are long outdated, and the provision has been used only rarely. However, an important exception is found in the provisions pertaining to the tuna fishery in the eastern tropical Pacific, which were implemented through domestic and multilateral programs (see section below on tuna-dolphin and the World Trade Organization [WTO]). Furthermore, Pelly certification of foreign countries for the use of high-seas driftnets by vessels flagged to their states also has directly addressed the issue of marine mammal bycatch in fisheries through the provisions of the High Seas Driftnet Fishing Moratorium Protection Act, which applies to illegal large-scale driftnet fishing.

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 steps taken to address marine mammal bycatch, as well as the levels of marine mammal take for 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.

On 4 April 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 all fish and fish products, not just swordfish as was requested in the petition

(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 it would apply to other nations in evaluating whether their fisheries result in bycatch that causes serious injury or mortality of marine mammals in excess of 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 faithfully observe 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. Such criteria would help clarify conditions for access to the U.S. market by exporting nations that seek to reduce bycatch in order 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 implement this as-yet unrealized congressional mandate, and the potential for fishery imports to be enjoined or limited through legal action because foreign nations might be unable to demonstrate that their marine mammal bycatch meets 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 modifications to their gear and/or fishing operations—are not put at an economic disadvantage relative to fleets in those nations that do not implement similarly effective conservation measures. This "level playing field" is focused on fisheries in foreign fleets whose product competes with domestically caught seafood in the same U.S. market.

In its advance 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 (e.g., bycatch below PBR level). 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.

During 2012 Commission staff participated in a number of interagency meetings addressing the draft proposed rule. As of December 2012 the proposed rule had not yet been issued.

Provisions for IUU, Bycatch, and Sharks

Illegal, unreported, and unregulated fishing—or IUU fishing—refers to fishing activities in both national and international waters around the globe that are in violation of domestic or multilateral management measures, such as the binding measures adopted in regional fishery management organizations. IUU fishing is not only detrimental to target species, it also is conducted with little regard for bycatch (including marine mammals) or the impact on habitats (e.g., bottom trawling in sensitive seafloor areas) (High Seas Task Force 2006). Furthermore, IUU fishing can have a detrimental economic impact on fishing operations that follow the rules on fishing and reporting (and therefore incur higher costs), and then have to compete with illegally harvested product on the market place (and therefore face lower prices and revenues). Independent experts have estimated that economic losses worldwide from IUU fishing are between $10 billion and $23.5 billion annually (Agnew et al. 2009).

There has been considerable progress at the multilateral level in addressing IUU fishing, in addition to some important unilateral actions by countries that are major importers of seafood products. In the

United States, the 2006 Magnuson–Stevens Fishery Conservation and Management Reauthorization Act amended requirements under the High Seas Driftnet Fishing Moratorium Protection Act. These amendments require the Secretary of Commerce to provide a biennial report to Congress that includes a list of "identified" nations whose fishing vessels are engaged in IUU fishing or that have ineffective measures to prevent bycatch of protected species. Following identification, the Secretary of Commerce, in collaboration with the Department of State, is required to consult with the identified nations to address the activities for which it has been identified. If sufficient action is taken to address the IUU or bycatch activities, the nation receives a positive certification in the subsequent report to Congress. Failure to take sufficient action can result in a negative certification and potentially incur trade measures to restrict imports of the seafood products associated with the fisheries of concern.

In 2012 final consultations were underway with the six countries that were identified in the 2011 report to Congress (Colombia, Ecuador, Italy, Panama, Portugal, and Venezuela), with a final decision expected in January 2013. While none of the six countries were identified under the bycatch provisions, some of the activities that were the basis of identification were associated with marine mammal bycatch, such as continued use of illegal driftnets by vessels flagged to Italy and fishing without authorization in the tuna-dolphin fishery by vessels flagged to Colombia. Because the amendments require identification for bycatch based on activities in the previous calendar year, it is extremely challenging to identify such under this provision due to lack of timely data. Annual fishery data (including reported or observed bycatch) are rarely available in the first month of the year when the report to Congress is due and therefore cannot often be used as a basis for identification of countries for bycatch by their fishing vessels.

Similar procedures for identification, consultation, and certification contained in the Shark Conservation Act (2010) were implemented in a proposed rule in 2012, which was expected to be published as a final rule in January 2013 (78 Fed. Reg. 25685). These regulations would provide similar procedures for identification and certification of countries whose vessels are fishing for sharks on the high seas but that do not have conservation measures similar to those in the United States (e.g., measures to prohibit the practice of finning sharks). Furthermore, this regulatory proposal would also amend the definition of IUU fishing in order to be more effective in addressing unsustainable fishing activities around the globe.

In general, multilateral measures addressing marine mammal bycatch are more effective in the long run than unilateral measures since many more countries are engaged in these fora. U.S. delegations to multilateral fora, including regional fishery management organizations, can use these meetings as opportunities to address bycatch through measures that require monitoring (e.g., with the use of observers) and reporting on the nature of such bycatch and by adopting binding measures to mitigate bycatch. A prime example is the measure adopted by the Western and Central Pacific Fisheries Commission in March 2012 calling for members to prohibit their vessels from setting purse seine nets on schools of tuna associated with cetaceans, to follow specific procedures in the event of an unintentional encirclement of cetaceans, and to report such encounters (http://www.wcpfc.int/doc/cmm-2011-03/conservation-and-management-measure-address-impact-purse-seine-activity-cetaceans). This measure will go into effect in January 2013.

Tuna-Dolphin and the World Trade Organization

U.S. tuna purse seiners in the eastern tropical Pacific developed the practice of encircling schools of dolphins with their fishing nets in the 1950s. In the early years of the fishery, hundreds of thousands of dolphins died each year as a result of this practice, which became one of the major issues behind the design and implementation of the Marine Mammal Protection Act in 1972 (Hofman 2009). The Act's provisions resulted in a sharp decline in the number of U.S. vessels participating in the fishery to the point that very few remained by the early 1980s. At the same time, however, participation in the fishery by vessels flagged to other eastern tropical Pacific coun-

tries increased. In reaction to public and government concerns about the impact on dolphins, dolphin mortality in the foreign sector of the fishery was managed under two voluntary international agreements until 1995 when the Panama Declaration resulted in the negotiation of a binding international accord known as the Agreement on the International Dolphin Conservation Program, which came into effect in 1999.

The goals of the agreement were and remain "(1) to progressively reduce incidental dolphin mortalities in the tuna purse-seine fishery in the Agreement Area to levels approaching zero, through the setting of annual limits; (2) with the goal of eliminating dolphin mortality in this fishery, to seek ecologically sound means of capturing large yellowfin tunas not in association with dolphins; and (3) to ensure the long-term sustainability of the tuna stocks in the Agreement Area, as well as that of the marine resources related to this fishery, taking into consideration the interrelationship among species in the ecosystem, with special emphasis on, inter alia, avoiding, reducing and minimizing bycatch and discards of juvenile tunas and non-target species" (NMFS 2013).

The agreement establishes conservative, species-specific and stock-specific, annual dolphin mortality limits, which are assigned by country and by vessel. In addition, the agreement mandates scientifically tested gear and fishing practices demonstrated to reduce dolphin mortality and injury. There is a 100 percent observer coverage requirement for the largest purse seine vessels, and reporting by these observers and vessel captains is part of the information used in compliance review and enforcement action by the parties to the agreement. Belize, Colombia, Costa Rica, Ecuador, El Salvador, European Union, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela are current parties, and Bolivia is applying the agreement provisionally (NMFS 2013).

The agreement has resulted in a marked decline in observed dolphin mortality in the eastern tropical Pacific purse seine fishery. For example, annual dolphin mortality was more than 130,000 animals in 1986 but has been below 2,150 dolphins since 1998. Observed mortalities in 2010 and 2011 were 1,179 and 986, respectively. Despite the decline in observed mortalities, however, the three stocks of dolphins that are most affected by the fishery—eastern spinner (S*tenella longirostris orientalis)*, northeast offshore spotted (S*tenella attenuata attenuata)*, and coastal spotted *(Stenella attenuata graffmani*)—are depleted under the Act's definition and are not recovering at the expected rate. Unfortunately, population abundance surveys to evaluate population trends and more recent field research to address the causes behind the lack of recovery of these dolphin stocks are lacking, including research on the possible impact of frequent and repeated chase and encirclement.

The U.S. implementing legislation for the multilateral agreement was passed in 1997 and authorized the use of a U.S. "dolphin-safe" label on tuna products from the dolphin set fishery only if the Commerce Department could conclude, following a specific scientific program, that the dolphin-set fishery was not harming depleted dolphin populations. The scientific program to determine whether the practice of setting on dolphins was having a significant adverse impact included three dolphin abundance surveys and specific tests to evaluate physiological stress due to chase and encirclement of dolphin schools. Following completion of the scientific program, the Secretary of Commerce issued a final decision in 2002 that there was insufficient evidence of the fishery having a significant adverse impact and, therefore, changed the definition of dolphin-safe to include tuna caught in association with dolphins (NMFS 2002). This decision was immediately overturned by a preliminary injunction, followed by litigation that upheld the original definition of dolphin-safe, notably "no tuna were caught in the trip in which such tuna were harvested using a purse seine net intentionally deployed on or to encircle dolphins, and no dolphins were killed or seriously injured during the sets in which the tuna were caught" (NMFS 2012).

Tuna caught in association with dolphins in the eastern tropical Pacific can be imported into the United States; however, the flag state must have obtained an affirmative finding with the Secretary of Commerce prior to selling canned/pouch tuna in the U.S. market. Affirmative finding status is based on good standing in, and compliance with, the agreement as well as other requirements. Even with such

an affirmative finding, any tuna caught by encirclement, or any tuna whose harvest resulted in serious injury or mortality of dolphins, may not use the U.S. government dolphin-safe label or any other similar label. However, with few exceptions, U.S. retailers only market tuna with the U.S. dolphin-safe label and, thus, the lucrative U.S. market is not readily available to product caught in association with dolphins.

In 2008 Mexico requested consultations under the World Trade Organization (WTO) regarding the dolphin-safe labeling standards in the United States, alleging that the U.S. definition of dolphin-safe imposed conditions for access of tuna to the U.S. market that are inconsistent with the General Agreement on Trade and Tariffs (GATT). A large number of WTO members joined in the consultations: Argentina, Australia, Brazil, Canada, China, Ecuador, the European Communities, Guatemala, Japan, Korea, New Zealand, Chinese Taipei, Thailand, Turkey, and Venezuela. A panel was composed and, following consultations, a final report issued in September of 2011. While the initial decision on this case by the WTO panel found in favor of Mexico regarding the nature of the measures—notably that they are a technical barrier to trade—the panel rejected Mexico's claim that the U.S. dolphin-safe measures discriminate against Mexican tuna products. Nevertheless, the panel did support Mexico's claim that the U.S. dolphin-safe measures are more trade restrictive than necessary to reach the objectives of the U.S. program.

In January 2012 the United States and Mexico separately notified the WTO of their decision to appeal the findings of the WTO panel. The U.S. appeal emphasized evidence of unobserved mortality due to effects of frequent chase and encirclement (notably the lack of recovery despite the significant reduction in observed mortalities), and a need to compare the combined observed and potential unobserved serious injury and mortality in the eastern tropical Pacific fishery with the estimated dolphin mortality in other tuna fisheries around the world. The appellate body overturned the initial panel's finding that U.S. trade measures are more restrictive than necessary to achieve its objectives, thereby eliminating the possibility that alternative labels, such as the label that was adopted by the parties to the agreement, could meet these objectives. However, the appeal also reversed the initial decision regarding whether the U.S. measures are discriminatory, noting that the current U.S. dolphin-safe program measures do not address dolphin mortality in tuna fisheries in other areas of the world. In June 2012 the United States indicated its need for a reasonable period of time to implement the recommendations of the WTO decision (WTO 2012).

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Chapter VIII

MARINE MAMMALS AND SOUND

Human-generated sound in the ocean can pose a risk to marine mammals and their ecosystems. Despite intensive research, analysis, and debate, the nature and severity of that risk remain controversial. The controversy is exacerbated by the variability of underwater sound propagation under various environmental conditions, the physiological and behavioral effects of sound on various marine mammal species and other marine species, and the difficulty in determining the biological significance of short- and long-term effects and responses. In addition, the cumulative effects from multiple sound sources have been difficult to assess.

Activities that introduce sound into the marine environment support national and global transportation and commerce (i.e., commercial shipping), energy acquisition (e.g., offshore 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), scientific research (e.g., marine geophysical and ecosystem studies), food acquisition (e.g., 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 the human population and our growing demand for marine resources and commercial goods. The challenge is to protect marine ecosystems, including marine mammals, without unnecessarily constraining human activities. Meeting that challenge requires the 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 chapter are recent research and regulatory activities that occurred in 2012.

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, to a lesser but increasing degree, on the use of seismic airguns for geophysical research and oil and gas exploration and development. Commercial shipping has received relatively little attention, despite the fact that it is a major source of low-frequency sound that can occur over large spatial and temporal scales. Any attention that has been generated has been focused on the mechanisms by which ships generate sound, potential sound-reduction measures, and—more recently—the reductions in marine mammal acoustic space as a result of masking (i.e., when an animal cannot detect biologically meaningful sounds or communicate effectively because the background sound level is too great).

In 2012 the Commission reviewed and provided recommendations on eight 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. However, in 2012 the Navy, the National Oceanic and Atmospheric Administration (NOAA), and the oil and gas industry also continued to co-sponsor a multi-investigator effort to assess behavioral responses of marine mammals that are exposed to controlled sounds under systematically varied signal characteristics. Similar studies have been conducted off Norway by a collaboration of U.S., Norwegian, Dutch, and British scientists. Australian scientists have initiated additional studies, which are partially funded by the U.S. Bureau of Ocean Energy Management.

U.S. Navy and Office of Naval Research

Over the past decade, the Navy has increased its focus on marine resource stewardship, including marine mammal conservation. During the past five years, the Navy provided more than $100 million in funding 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. The Living Marine Resources program[1] is the Navy's applied science program that bridges the basic research of the Office of Naval Research with Navy operational expenditures regarding marine mammal conservation. In 2012 the Living Marine Resources program distributed approximately $7.5 million to about 25 universities, government laboratories, and other government and private sector entities. More than half of that was directed toward research involving collaboration between the Navy and the Office of Naval Research or the Navy and academic researchers. In the collaboration with academic researchers, various marine mammal research methods (visual surveys, tagging, photo-identification, and genetics) were used simultaneously on Navy ranges to derive statistically robust estimates of animal density, habitat use, and movement patterns. Such research eventually will enable data collected by only one of those methods to be used with greater confidence by resource managers and planners.

In 2012 new projects for the Living Marine Resources program included the development of visual line-transect survey data collection and reporting conventions. That development was led by the U.S. Geological Survey and the University of Colorado at Boulder. The ability to merge data collected around the world by various researchers and to compare trends in abundance and distribution over time is greatly restricted by the lack of community-wide reporting standards for data collection. The program also renewed its efforts in hearing research, laboratory studies of both hearing thresholds for risk assessments and frequency-dependent weighting functions, and field studies with stranded animals that measure auditory evoked potentials.

In 2012 the Office of Naval Research supported basic and early-stage applied research including approximately $11.8 million for studies regarding (1) the effects of sound exposure on marine mammal behavior, physiology (diving and stress response), and hearing and on populations as a whole; (2) computer models of acoustic effects on marine life; and (3) novel technologies for monitoring marine mammal behavior, habitat use, and movement patterns.

Behavioral response studies: The Navy initiated behavioral response studies (i.e., controlled exposure experiments) 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 in the western Mediterranean Sea, and in 2010 a five-year behavioral response study was initiated in the Southern California Bight where the Navy conducts extensive sonar training exercises. In 2012 researchers tagged 20 animals in waters off Southern California from nine species of marine mammals, including attaching an acoustic/movement tag for the first time on a Baird's beaked whale (*Berardius bairdii)*, attaching tags on traveling/calling baleen whales (Figure VIII-1), and attaching tags on species that had not been tagged previously during the behavioral response study (i.e., the humpback whale [*Megaptera novaeangliae*] and common dolphin [*Delphinus* spp.]). In addition, the Navy (including the Office of Naval Research) funded behavioral response work in Cape Hatteras, Hawaii, and the Mediterranean Sea and a large international collaborative effort in Norwegian waters.

1 www.lmr.navy.mil

Figure VIII-1. Tagging a fin whale during a behavioral response study in waters off Southern California. (Photo courtesy of John Calambokidis)

The Office of Naval Research also sponsored a workshop in November 2011 to update, discuss, and synthesize the results from the various behavioral response projects conducted as of that date. The workshop served as the initial meeting for a three-year working group, the Multi-study Ocean Acoustics Human Effects Analysis project, which aims to develop and implement innovative methods for analyzing data from various cetacean behavioral response studies. The working group met twice in 2012, once for start-up and once to discuss data on deep divers (i.e., the beaked whale [family Ziphiidae] and sperm whales). A broad description of the research approach[2] and of the southern California behavioral response studies[3] can be found online.

Population consequences of acoustic disturbance: In 2009 the Office of Naval Research and the University of California at Santa Barbara convened what was designated as Phase I of a working group and sponsored a series of meetings on the population consequences of acoustic disturbance (PCAD). The PCAD model (Figure VIII-2), developed by a National Research Council panel (National Research Council 2005), provides a heuristic approach for translating the effects of exposure to sound on individuals into population-level effects.

The working group, consisting of an international team of researchers, met five times as a part of Phase I. The first four meetings focused on development of quantitative mathematical relationships to fit the conceptual PCAD model for four data-rich species (or species groups) with various life history

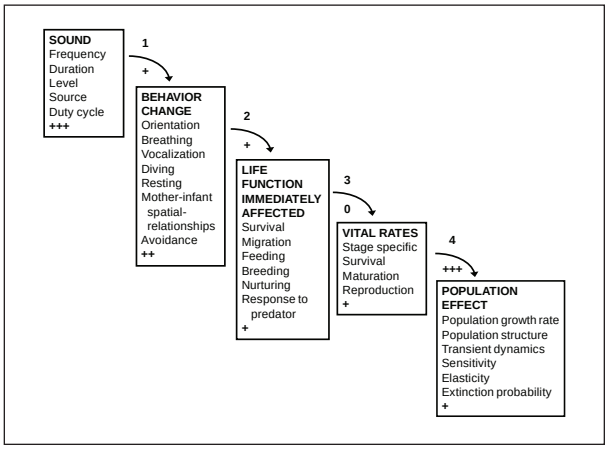

Figure VIII-2: The conceptual PCAD model describes several stages required to relate acoustic disturbance to effects on a marine mammal population. It identifies five groups of variables related by transfer functions (e.g., describing how sounds of a given frequency affect the vocalization rate of a 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. 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).

2 www.creem.st-and.ac.uk/mocha
3 www.sea-inc.net/socal-brs

strategies (i.e., the northern elephant seal [*Mirounga angustirostris*], coastal bottlenose dolphin [*Tursiops truncatus*], North Atlantic right whale [*Eubalaena glacialis*], and beaked whales). The final working group meeting in Phase I was held in October 2011 in Washington, DC. The Office of Naval Research and the Marine Mammal Commission held a symposium[4] in conjunction with that meeting to present results to date.

In 2012 the Office of Naval Research sponsored a two-and-a-half year Phase II of the PCAD working group, which was renamed the Population Consequences of Disturbance (PCoD) group. The name change reflects the fact that the revised framework (Figure VIII-3) can be used to model the impact of many types of disturbance in addition to acoustic. The goal of Phase II is to complete outstanding Phase I case studies and explore the use of expert elicitation to replace empirical data in the mathematical relationships and hence make the emerging model more transferable to other data-poor species and populations.

Bureau of Ocean Energy Management

In 2012 the Bureau of Ocean Energy Management contributed more than $5 million toward research related to marine mammals and sound. In particular, the Bureau continued to direct resources toward the study of the behavioral response of Australian humpback whales to seismic surveys to assess the effects of such surveys on the species in Australian waters. Among other things, that multi-year study will evaluate the effectiveness of ramp-up procedures used during seismic activities. Those procedures involve 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.

Determining the population-level effects of sound on marine mammals requires robust baseline information regarding the distribution, abundance, and trends of the potentially affected populations. In this regard, in 2012 the Bureau contributed more than $1 million to a large-scale study of the 38

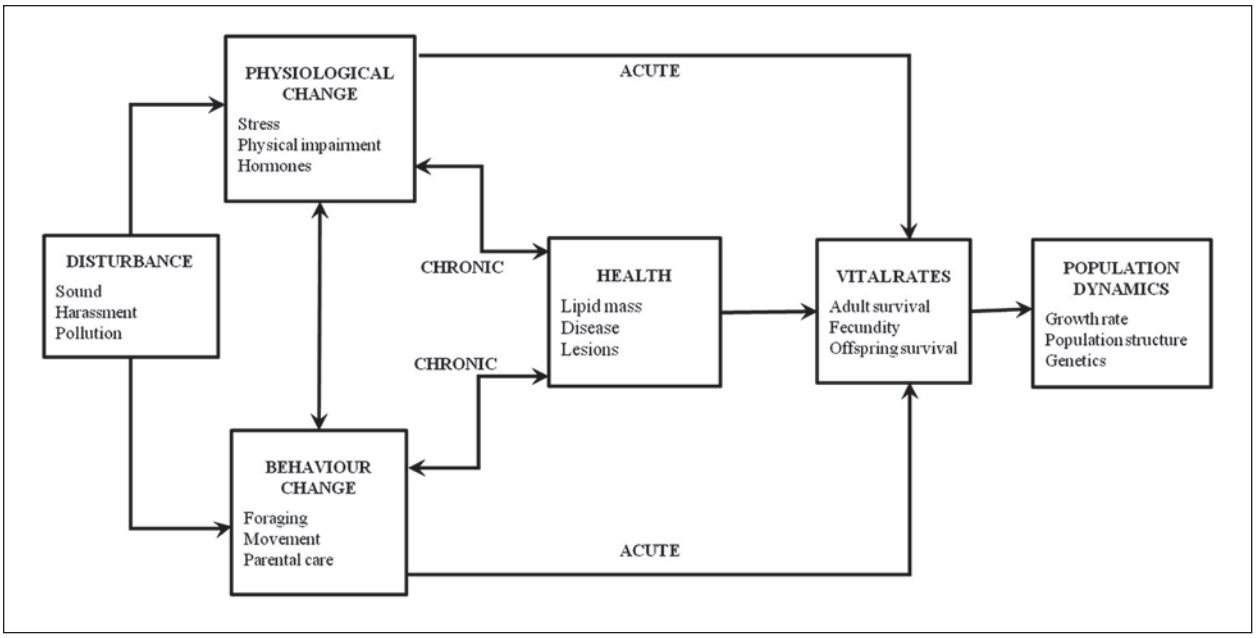

Figure VIII-3: Conceptual framework to assess the Population Consequences of Disturbance (New et al. *In review*). Revisions of the original NRC framework (NRC 2005) by Phase I of PCoD now allow for consideration of multiple sources of disturbance, not just acoustic, and consideration of physiological as well as behavioral changes in response to disturbance. The revised framework accounts for the fact that, while some disturbances may affect vital rates directly (the "acute pathway"), many smaller insults over time may accumulate into effects on vital rates through effects on animal health and body condition (the "chronic pathway").

4 www.mmc.gov/announcement_archive.shtml

described bay, sound, and estuary stocks of bottlenose dolphins in the Gulf of Mexico and sperm whales in the eastern 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 other large-scale threats to the Gulf of Mexico marine ecosystem.

In the Arctic, the Bureau is continuing to fund long-term studies of the migration and feeding habits of the polar bear (*Ursus maritimus)*, bowhead whale (*Balaena mysticetus)*, walrus (*Odobenus rosmarus*), and ice seals in the Chukchi and Beaufort Seas. Those studies include satellite tracking of tagged individuals, aerial surveys, and passive acoustic monitoring. Again, such work will provide important baseline information for understanding potential effects of oil and gas development.

National Science Foundation

In 2012 the National Science Foundation directed about $2.4 million to the study of potential effects of sound on marine mammals. The Foundation supports research-based marine geophysical surveys throughout the world (Figure VIII-4). During those surveys, operators are required to collect marine mammal monitoring data that the Foundation archives in a database. Those data are publicly accessible through OBIS-USA (www.usgs.gov/obis-usa/), OBIS-SEAMAP (http://seamap.env.duke.edu), and the National Oceanographic Data Center (www.nodc.noaa.gov). The Foundation also is supporting or has supported—

- 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;
- 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;
- modeling of long- and short-term marine mammal population trends in the Gulf of Mexico using passive acoustic monitoring data following the *Deepwater Horizon* oil spill; and
- expanding metadata management and processing of acoustic data in OBIS-SEAMAP.

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)

National Oceanic and Atmospheric Administration

The National Marine Fisheries Service's Office of Science and Technology supports the Ocean Acoustics Program, which sponsors research on human-generated sound and its effects on the marine environment. The program's research funds (approximately $550,000) are dispersed internally via a request for proposals to other NOAA offices and cooperating institutes and externally through multi-agency grants issued through the National Oceanographic Partnership Program. In fiscal year 2012 the program supported research on—

- developing and testing a pelagic buoy-based recording system for ocean sound measurements and passive acoustic monitoring;
- developing passive acoustic monitoring to conserve fish species, which includes identifying spawning aggregations and understanding call behavior of Atlantic cod (*Gadus morhua*) and effects of anthropogenic sound on their calling behavior;
- developing a centralized database for marine mammal hearing data;
- characterizing ship sounds on the calving grounds of North Atlantic right whales;
- passive acoustic ocean observing of marine mammals and anthropogenic sound in the Arctic;
- measuring ambient sound in the North Atlantic;
- investigating sound exposure to vessels and the effects on foraging in southern resident killer whales (*Orcinus orca)*; and
- evaluating potential effects of satellite tagging on humpback whales in the Gulf of Maine.

Cetacean distribution, density, and underwater sound field mapping working groups (CetSound): In 2011 NOAA convened two independent working groups. The goal of the Underwater Sound Field Mapping Working Group (SoundMap) was to develop tools to map the contribution of human sound sources to underwater ocean noise in U.S. waters. The goal of the Cetacean Distribution and Density Mapping Working Group (CetMap) was to create regional time- and species-specific cetacean density and distribution maps for U.S. waters. Both groups were chaired by NOAA personnel and included technical experts from that agency, the Navy, the Bureau of Ocean Energy Management, the National Park Service, academia, and environmental consultancies. Participants met for working sessions in 2011 and again in May 2012. Analysis teams from Heat, Light and Sound Research, Inc., and Duke Marine Laboratory were contracted to assist with tool-building efforts for SoundMap and CetMap, respectively. The one-year analytical effort was supported financially by NOAA, the Navy, and the Bureau of Ocean Energy Management. In May 2012 NOAA convened a two-day Mapping Cetaceans and Sound Symposium in Washington DC, which provided an open forum to share SoundMap and CetMap Working Group products and to discuss potential management solutions with participants from a wide range of researchers, agency representatives and stakeholders. The symposium received broad support for both the work conducted and the open process, as described in the symposium report, available with the CetSound products and associated metadata on the project's website.[5]

Marine Mammal Commission

Between August 2011 and August 2012, the Commission sponsored two National Research Council postdoctoral fellows working on research related to marine mammals and the cumulative effects of sound. Leslie New developed an energetics model for beaked whales that can be used to assess the potential population consequences of disturbances that result in lost foraging opportunities (New et al. *in review*). She plans to apply the model to the northern bottlenose whale (*Hyperoodon ampullatus*) in the Gully, Nova Scotia, to consider the effectiveness of a nearby marine protected area for the species in relation to exposure to seismic airguns. The model also will be used by the PCoD working group when considering the potential impact on beaked whales from exercises on the Atlantic Undersea Test and Evaluation Center and Southern California Range Complex. Megan McKenna, in collaboration with Heat, Light and Sound, Inc., developed and applied

5 cetsound.noaa.gov

spatially explicit acoustic propagation models to assess sound exposure from commercial shipping in marine mammal habitat off the West Coast of the United States. The framework provided a method to assess the effects of various shipping routes, quieting technologies, or ship type composition on the cumulative sound exposure levels. The results were presented at the European Underwater Acoustic Conference in July 2012. She also integrated blue whale (*Balaenoptera musculus*) behavior data obtained from suction-cup tags with commercial ship traffic data to investigate whale responses to both the sound of and the close passage of large ships. The results have implications for large whale vulnerability to ship strikes.

Other Research

Private industry and foreign governments 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). In addition, several oil and gas companies have invested in research on, and monitoring of, potential sound effects on marine life. Examples include monitoring the potential effects of oil and gas development on the western population of the gray whale (*Eschrichtius robustus*) in the nearshore waters off Sakhalin Island, Russia,[6] monitoring the potential effects of offshore drilling at the Northstar facility on bowhead whales and other marine mammals in the Beaufort Sea, and acoustically monitoring the occurrence of marine mammals and effects of noise thereon in the Chukchi Sea.[7]

Joint Industry Programme: A consortium of oil and gas companies[8] has established and maintained the Exploration & Production Sound and Marine Life Joint Industry Programme, in cooperation with the International Association of Oil and Gas Producers in London. Phase I of 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. Major research categories identified for funding included 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.[9] Phase II of the program (2006–2008) funded three large-scale projects: (1) to characterize the sounds produced by a three-dimensional airgun array, (2) to develop a tag to study movements and dive patterns of sperm whales, and (3) to develop a passive acoustic mitigation system called PAMGUARD. In 2011 Phase II of the program was extended to fund research on the sound characteristics of a single airgun array and, with the Bureau of Ocean Energy Management, behavioral response studies to assess the effects of seismic surveys on humpback whales in Australian waters. It also funded smaller projects to assess whether marine vibroseis might have fewer biological effects than airguns and to monitor and mitigate potential sound effects on marine mammals. For the first three years after inception, the program contributed about $8 million each year for research. Funding in subsequent years was about half of that level, approximately $3.8 million each year. The participating companies decided not to add any new funds to the program in 2012 pending a program review.

In May 2012 the Joint Industry Programme convened a meeting in Herndon, Virginia, to review and solicit input on the research projects supported to date and to identify and prioritize key unanswered questions for future research. Participants included representatives of the offshore oil and gas industry, federal regulators, and international experts on marine mammals, sound, and acoustic ecology. In 2013 the program's executive committee will use the results of the program review to determine whether a third phase of research projects is warranted. The Commission wrote to the chairman of the executive committee in June 2012 thanking the committee for

6 www.sakhalinenergy.com/en

7 www.chukchiscience.com

8 Companies participating in the Joint Industry Program in 2006 were Andarco, BG Group, BHP Billiton, BP, Chevron, ConocoPhillips, ENI, ExxonMobil, International Association of Geophysical Contractors (IAGC), Santos, Shell, Statoil, TOTAL, and Woodside.

9 www.soundandmarinelife.org

its leadership in addressing research priorities related to sound and its effects on the marine environment and encouraging the committee to support a third phase of the program's collaborative research efforts. Research priorities identified by the Commission included—

- determining the biological significance of physical, physiological, and behavioral responses of marine mammals and their prey to sound;
- understanding the long-term and cumulative effects of both individual and multiple sound sources on the marine environment;
- developing web-based systems for compiling, archiving, and accessing survey and observer data and other research results from program-funded projects; and
- investigating the potential environmental effects of new technologies (i.e., marine vibroseis and active acoustic monitoring).

Cumulative effects: In 2010 BP America Production Company, Inc., and the University of California at 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 brought 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 to assess cumulative effects 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 in 2011, which continued throughout 2012.

Regulatory Activities

The Commission reviewed 36 analyses for proposed regulatory actions in 2010, 50 in 2011, and 44 in 2012. The analyses focused almost entirely on the potential impact of human-generated sound on marine mammals and the marine environment (Table VIII-1). The annual variation in number of analyses is attributed in part to the Navy's amendment of numerous regulations and letters of authorization that govern the taking of marine mammals incidental to conducting training and testing activities and in part to an increase in the number of proposed seismic and geophysical surveys, particularly in the Arctic, in 2011. Because the Navy's current five-year regulations are scheduled to expire in 2014, it also had begun applying for letters of authorization in 2012. In addition, the number of authorizations for taking marine mammals incidental to scientific research more than doubled in 2012, primarily due to greater awareness by researchers of the requirement to obtain the proper authorization if their activities had the potential to harass marine mammals.

The Commission's primary aim in reviewing those analyses is to determine if—

- the means of taking have been described accurately;
- 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 to Alaska Natives for subsistence; 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.

General Mitigation and Monitoring Concerns

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 prevent impacts 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 and 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 are important if they reduce the probabilities of survival or reproduction of the affected animals. Examples include separation of female-calf pairs, disruption of social interactions that are essential for foraging or reproduction, or displacement from prime habitat.

All mitigation and monitoring measures have various shortcomings (e.g., visual observation generally is not effective at night or during inclement weather; see Moore et al. 2012). To address those problems, the Commission generally recommends that mitigation and monitoring measures be applied in a precautionary manner (e.g., use maximum- versus mean-sized safety zones), that multiple measures be used to compensate for the shortcomings of any single measure (e.g., combine visual and acoustic monitoring), and that the action proponent and the authorizing Service collect the information needed to improve the measures over time (e.g., 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; Figure VIII-5);
- 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;
- use passive acoustic monitoring to detect marine mammals;
- use ramp-up, delay, power-down, and shutdown procedures when marine mammals are or may be within an area where 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 for implementing 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

Figure VIII-5. Implementation of a bubble curtain during pile-driving activities associated with construction of the new Sellwood Bridge in Oregon. (Photo courtesy of Sellwood Bridge Project)

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 states, 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.

The Services also normally stipulate that, when sound sources have been powered down or shut 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 the sperm whale, pygmy sperm whale [*Kogia breviceps*], dwarf sperm whale [*K. sima*], 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 shutdown procedures have been implemented. The National Marine Fisheries Service has not yet implemented this recommendation.

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 a challenge. To address the uncertainty in those 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 credible, reasonably accurate assessment of the types of marine mammal taking, the numbers of marine mammals taken, and the overall impact of the activity. A number of approaches 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 activity. Some methods may not be practicable for certain proposed activities (e.g., those that are to be conducted only once or those occurring in remote areas where few marine mammals will be encountered). However, other proposed activities warrant more specific monitoring if they occur in areas where large numbers of marine mammals are likely to occur, some of the marine mammals are endangered or threatened, or the activities will be repeated frequently and are more likely to cause a long-term or permanent impact (e.g., seismic surveys used to support oil and gas development and production).

In 2012 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.

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Table VIII-1. Regulatory documentation reviewed by the Marine Mammal Commission in 2012. DEIS = Draft Environmental Impact Statement, FEA = Final Environmental Assessment, NOI = Notice of Intent, DEA = Draft Environmental Assessment, DPEIS = Draft Programmatic Environmental Impact Statement, DEIS/OEIS = Draft Environmental Impact Statement/Overseas Environmental Impact Statement, ANPR = Advanced Notice of Proposed Rulemaking

Action Proponent	Proposed Action	Regulatory Documentation	Commission Letter Date	*Federal Register* Notice (date, issue:page)
St. George Reef Lighthouse Preservation Society	Construction activities for restoration of lighthouse off coast of Crescent City, California	101(a)(5)(D)	3-Jan-12	12-Dec-11 76:79517
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)	6-Feb-12	6-Jan-12 77:842
Bureau of Ocean Energy Management	Proposed lease sales in the Western and Central Planning Areas in the Gulf of Mexico for the 2012–2017 leasing program	DEIS	15-Feb-12	30-Dec-11 76:82319
Ocean Renewable Power Company Maine, LLC	Construction activities for installation of a tidal energy turbine in Cobscook Bay, Maine	101(a)(5)(D)	21-Feb-12	19-Jan-12 77:2701
Lamont-Doherty Earth Observatory	Marine geophysical survey at Shatsky Rise in the northwest Pacific Ocean	101(a)(5)(D)	27-Feb-12	31-Jan-12 77:4765
National Marine Fisheries Service	Oil and gas activities in the Arctic Ocean	DEIS	28-Feb-12	30-Dec-11 76:82275
Glenn VanBlaricom, Ph.D.	Research activities during abalone surveys on San Nicolas Island, California	101(a)(5)(D)	19-Mar-12	29-Feb-12 77:12246
U.S. Navy	Naval Surface Warfare Center, Panama City Division Testing Range–testing of the AN/AQS-20A Mine Reconnaissance Sonar System (Q-20) in the Gulf of Mexico	101(a)(5)(D)	20-Mar-12	28-Feb-12 77:12010
Sonoma County Water Agency	Construction and maintenance activities in association with estuary management at the Russian River near Jenner, California	101(a)(5)(D)	26-Mar-12	16-Mar-12 77:15722
Bureau of Ocean Energy Management	Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf offshore New Jersey, Delaware, Maryland, and Virginia	FEA	26-Mar-12	
Scripps Institution of Oceanography	Marine geophysical survey off Chile in the southeast Pacific Ocean	101(a)(5)(D)	27-Mar-12	13-Mar-12 77:14744
Lamont-Doherty Earth Observatory	Marine geophysical survey off the Line Islands in the central Pacific Ocean	101(a)(5)(D)	09-Apr-12	30-Mar-12 77:19242
Monterey Bay National Marine Sanctuary	Permitting commercial firework displays within the Sanctuary waters of California	101(a)(5)(A)	11-Apr-12	3-Apr-12 77:19976

Action Proponent	Proposed Action	Regulatory Documentation	Commission Letter Date	*Federal Register* Notice (date, issue:page)
AMEC Environment & Infrastructure, on behalf of Fishermen's Atlantic City Windfarm, LLC	Construction activities for installation of wind turbines off the New Jersey coast	101(a)(5)(D)	12-Apr-12	13-Mar-12 77:14736
U.S. Navy	Silver Strand Training Complex–underwater detonation and elevated causeway system training exercises near San Diego Bay	101(a)(5)(D)	30-Apr-12	30-Mar-12 77:19231
Bureau of Ocean Energy Management	Proposed special-interest lease sale 244 within the Cook Inlet planning area in Alaska	NOI	7-May-12	27-Mar-12 77:18260
Lamont-Doherty Earth Observatory	Marine geophysical surveys off the West Coast of the United States in the northeast Pacific Ocean	101(a)(5)(D)	14-May-12	2-May-12 77:25966
Department of Transportation's Federal Transit Authority and Federal Highway Administration, on behalf of the Columbia River Crossing project	Construction and demolition activities in the Columbia River and North Portland Harbor, Washington and Oregon	101(a)(5)(A)	15-May-12	19-Apr-12 77:23548
Bureau of Ocean Energy Management	Lease issuance for marine hydrokinetic testing technology on the Outer Continental Shelf offshore Florida	DEA	25-May-12	25-Apr-12 77:24734
BP Exploration (Alaska), Inc.	Marine seismic survey in the Simpson Lagoon area of the Beaufort Sea, Alaska	101(a)(5)(D)	1-Jun-12	1-May-12 77:25830
U.S. Navy	Naval Base Kitsap–construction activities during repair of explosive handling wharf-1 in Bangor, Washington	101(a)(5)(D)	25-Jun-12	30-Apr-12 77:25408
America's Cup Event Authority and the Port of San Francisco	Construction activities, helicopter overflights, and firework displays in support of the 34th America's Cup in San Francisco, California	101(a)(5)(D)	26-Jun-12	1-Jun-12 77:32573
U.S. Navy	Naval Base Kitsap–construction activities for installation of explosive handling wharf-2 in Bangor, Washington	101(a)(5)(D)	27-Jun-12	21-Dec-11 76:79410
Bureau of Ocean Energy Management	Geological and geophysical exploration of the Atlantic Outer Continental Shelf	DPEIS	2-Jul-12	30-Mar-12 77:19321
U.S. Navy	Mariana Islands Range Complex–training activities, primarily underwater detonations with time-delay firing devices	101(a)(5)(A) Letter of Authorization	5-Jul-12	7-Jun-12 77:33718
United Launch Alliance	*Delta Mariner* operation, cargo unloading, and harbor maintenance activities at South Vandenberg Air Force Base, California	101(a)(5)(D)	10-Jul-12	28-Jun-12 77:38537

Action Proponent	Proposed Action	Regulatory Documentation	Commission Letter Date	*Federal Register* Notice (date, issue:page)
U.S. Navy	Atlantic Fleet Training and Testing study area–exercises using low-, mid-, high- and very high-frequency active sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations (including ship shock trials), expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft in the western North Atlantic Ocean, Gulf of Mexico, and Caribbean Sea	DEIS/OEIS	10-Jul-12	11-May-12 77:27742
U.S. Navy	Hawaii–Southern California Training and Testing study area–exercises using low-, mid-, high- and very high-frequency sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations, expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft in the eastern and central North Pacific Ocean	DEIS/OEIS	10-Jul-12	11-May-12 77:27743
U.S. Air Force	Eglin Air Force Base's Gulf of Mexico Test and Training Range–precision strike weapon and air-to-surface gunnery exercises	101(a)(5)(A) ANPR	11-Jul-12	28-Jun-12 77:38595
Washington State Department of Transportation Ferries Division	Construction activities for the Port Townsend Ferry Terminal Transfer Span in Puget Sound, Washington	101(a)(5)(D)	26-Jul-12	3-Jul-12 77:39471
Bureau of Ocean Energy Management	Commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf offshore Rhode Island and Massachusetts	DEA	2-Aug-12	3-Jul-12 77:39508
Washington State Department of Natural Resources	Construction activities for removal of derelict piling and associated structures in Woodard Bay Natural Resource Conservation Area in Puget Sound, Washington	101(a)(5)(D)	9-Aug-12	30-Jul-12 77:44583
Honolulu Seawater Air Conditioning, LLC	Construction activities for a seawater air conditioning project in the waters off Honolulu, Hawaii	101(a)(5)(D)	22-Aug-12	24-Jul-12 77:43259
Gulf of the Farallones National Marine Sanctuary	Research activities during abalone surveys on the Farallon Islands, California	101(a)(5)(D)	30-Aug-12	23-Aug-12 77:50990
U.S. Fish and Wildlife Service	Research activities on bird hazing methods in the Farallon National Wildlife Refuge, California	101(a)(5)(D)	12-Sept-12	27-Aug-12 77:51773

Action Proponent	Proposed Action	Regulatory Documentation	Commission Letter Date	*Federal Register* Notice (date, issue:page)
ION Geophysical	In-ice seismic survey in the Beaufort and Chukchi Seas, Alaska	101(a)(5)(D)	21-Sept-12	17-Aug-12 77:49922
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)	26-Sept-12	21-Aug-12 77:32573
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)	9-Oct-12	27-Sept-12 77:59377
Pacific Gas and Electric Company and Lamont-Doherty Earth Observatory	Marine geophysical survey to be conducted in the vicinity of a nuclear power plant near Morro Bay, California (for Fish and Wildlife Service species)	101(a)(5)(D)	11-Oct-12	26-Sept-12 77:59211
Pacific Gas and Electric Company and Lamont-Doherty Earth Observatory	Marine geophysical survey to be conducted in the vicinity of a nuclear power plant near Morro Bay, California (for National Marine Fisheries Service species)	101(a)(5)(D)	11-Oct-12	19-Sept-12 77:58256
Port Dolphin Energy LLC	Construction and operational activities for an offshore liquefied natural gas facility, Port Dolphin Deepwater Port, in the eastern Gulf of Mexico	101(a)(5)(A)	25-Oct-12	10-Sept-12 77:55646
U.S. Navy	Atlantic Fleet Training and Testing study area–exercises using low-, mid-, high- and very high-frequency active sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations (including ship shock trials), expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft in the western North Atlantic Ocean, Gulf of Mexico, and Caribbean Sea	101(a)(5)(A) ANPR	5-Nov-12	4-Oct-12 77:60679
U.S. Navy	Hawaii–Southern California Training and Testing study area–exercises using low-, mid-, high- and very high-frequency sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations, expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft in the eastern and central North Pacific Ocean	101(a)(5)(A) ANPR	5-Nov-12	4-Oct-12 77:60678
Partnership for the Interdisciplinary Study of Coastal Oceans	Research activities for conducting rocky intertidal monitoring surveys along the coasts of California and Oregon	101(a)(5)(D)	13-Nov-12	19-Oct-12 77:64320

Chapter IX

RESEARCH AND STUDIES PROGRAM

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 2012 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—

- participated in a three-day workshop in Anchorage, Alaska, focused on improving the consultation process between coastal Alaska Natives and federal agencies;
- met with the Alaska Eskimo Whaling Commission to discuss a possible expansion of the conflict avoidance agreement that subsistence hunters sign with oil and gas companies to minimize the impact of exploration activities on bowhead whale (*Balaena mysticetus*) hunts;
- as a member of the U.S. delegation to the International Whaling Commission (IWC), met in Barrow, Alaska, with the Alaska Eskimo Whaling Commission and the Russian IWC Commissioner in February and in Neah Bay, Washington, with the Makah Tribal Council in April to consult on preparations for the 64th annual meeting of the IWC;
- served on the U.S. delegation attending the 64th annual IWC meeting in Panama City, Panama, in June and July, which resulted in the renewal of U.S. aboriginal subsistence whaling catch limits for bowhead and gray whales (*Eschrichtius robustus*);
- joined an international team of scientists in January to participate in a week-long workshop to refine understanding of the status of Mekong river dolphins (*Orcaella brevirostris*), determine causes of unusually high calf mortality in recent years, and improve protection measures, particularly relating to bycatch in gillnets;
- attended the International Workshop for Capacity Building on Marine Mammal Stranding held in Peru to develop a stranding network and review the report on the unusual dolphin stranding event in April;
- attended the California Gray Whale Scientific Workshop in March in San Francisco, organized and sponsored by the California Gray Whale Coalition;

- participated in a September stakeholder conservation planning workshop to develop a Hawaiian monk seal (*Monachus schauinslandi*) management plan for the Main Hawaiian Islands;
- participated on the International Committee for the Recovery of the Vaquita (*Phocoena sinus*) and served as rapporteur for the Committee's fourth meeting, held in Baja California, Mexico, working toward development and widespread adoption of "vaquita-safe" shrimp trawl nets;
- participated in a meeting with the National Science Foundation and attended by representatives of the National Marine Fisheries Service, U.S. Geological Survey, and the Lamont-Doherty Earth Observatory to address Commission concerns over National Science Foundation-funded geophysical surveys and low-energy Geological Survey surveys—including, among other things, the current model used to estimate harassment zones, incorporating uncertainty in density estimates, and revising the formula used to estimate numbers of animals potentially taken during surveys based on actual survey observations;
- attended the February New England Derelict Fishing Gear Workshop in Portland, Maine, to discuss ways of mitigating the impact of derelict fishing gear in the northeastern United States;
- attended the November Interagency Ocean Observation Committee Summit national meeting to develop a strategy for ocean observing over the next decade;
- participated in one of a series of workshops sponsored by BP and the University of California at Santa Barbara to develop one or more standardized, practical methods for routinely assessing the cumulative effects of anthropogenic underwater sound on marine mammals;
- made a presentation celebrating the 40th anniversary of the Marine Mammal Protection Act at Capitol Hill Ocean Week 2012 hosted by the National Marine Sanctuaries Foundation in Washington, DC;
- participated in the second U.S. Animal Telemetry Network Workshop in Washington, DC, to establish a sustainable U.S. Animal Telemetry Observing Network and link observations from marine animals to the National Ocean Observing System;
- attended a three-day meeting in April reviewing the Office of Naval Research's research program on marine mammals;
- attended CetSound Symposium in Washington, DC, entitled "Mapping Cetaceans and Sound: Modern Tools for Ocean Management" in May;
- attended a review of the Sound and Marine Life Joint Industry Program in Herndon, Virginia;
- 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 to marine mammals;
- participated in the first in a series of meetings with National Marine Fisheries Service regional science center leadership and program staffs to discuss the Service's strategic prioritization of marine mammal research and conservation activities;
- attended the Alaska Marine Science Symposium in Anchorage, Alaska, which brought together scientists, policymakers, students, educators, media, and the public to share research findings on Alaska's marine fisheries and ecosystems;
- participated in a briefing for Commission staff by the National Marine Fisheries Service Office of Protected Resources to discuss options for extending regulations to limit ship speeds on the Atlantic coast to protect North Atlantic right whales (*Eubalaena glacialis*);
- Participated in an April workshop hosted by Ocean Conservancy and the Gulf of Mexico University Research Collaborative at the University of South Florida, St. Petersburg, to develop recommendations for restoration of the Gulf of Mexico marine ecosystem after the *Deepwater Horizon* oil spill;
- met with the Director of the Bureau of Ocean Energy Management in Washington, DC, to discuss research needs and management strategies to minimize effects of oil and gas and renewable energy activities on marine mammals;
- co-sponsored and participated in a meeting to review the terms of reference for a National

Academy of Sciences panel on responding to oil spills in the Arctic;
- attended the Northern Oil and Gas Forum in Anchorage, Alaska, to discuss current research on oil and gas exploration and development, oil spill response, and the impact on marine mammals and other wildlife;
- participated in a November meeting with representatives from Shell to discuss oil and gas exploration in offshore waters, current data gaps, and options for enhancing mitigation and monitoring measures;
- participated in a November briefing for Commission staff by National Marine Fisheries Service leadership to discuss agency plans for issuing an environmental impact statement on the issuance of an incidental take authorization for fisheries research activities by the Service's centers; and
- attended the Gulf of Mexico Mitigation and Monitoring Workshop hosted by the National Marine Fisheries Service and the Bureau of Ocean Energy Management in Herndon, Virginia, to discuss options for enhancing mitigation and monitoring measures in the Gulf of Mexico.

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 (*Trichechus manatus latirostris*);
- take reduction teams (or their subgroups) convened to reduce takes of false killer whales (*Pseudorca crassidens*), Atlantic large whales, Gulf of Maine harbor porpoises (*Phocoena phocoena*), and pilot whales (*Globicephala* spp.);
- scientific review groups convened under the Marine Mammal Protection Act to review annual updates of stock assessments and marine mammal-fishery interactions, including meetings in Sarasota, Florida, and Anchorage, Alaska, to review Atlantic, Gulf of Mexico, and Alaska draft marine mammal stock assessment reports;
- monthly meetings with the Fish and Wildlife Service, National Marine Fisheries Service, Animal and Plant Health Inspection Service, and Department of State to improve coordination on issues regarding research/captive marine mammal permits;
- quarterly meetings with the Interagency Coordinating Group on Acoustics, Interagency Working Group on Ocean Partnerships' ad hoc Biodiversity Committee, and Interagency Ocean Observation Committee;
- various meetings of the Interagency Marine Debris Coordinating Committee to consider federal actions to mitigate the impact of marine debris;
- a meeting with Fish and Wildlife Service and National Marine Fisheries Service representatives regarding issues of enhancement under the Marine Mammal Protection Act and the Endangered Species Act, specifically how the term "enhancement" applies to research, captivity/public display, and section 109(h) permitting issues;
- the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve Advisory Council Meeting and the Papahānaumokuākea Interagency Coordinating Committee meeting to review developments in the Papahānaumokuākea Marine National Monument; and
- The Working Group for Marine Mammal Unusual Mortality Events Annual Meeting.

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. For some requests, the Commission will provide seed funding enabling the requestor to attract matching amounts from other sources and thereby fully fund the proposed project. Since it was established in 1972, the Commission has funded more than 1,000 projects, ranging in amounts contributed 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.[1]

Commission-sponsored Research Projects Funded in 2012

During 2012 the Commission evaluated all unsolicited proposals received but, largely due to budget limitations, was able to fund only four. In consultation with the Committee of Scientific Advisors on Marine Mammals, the Commission selected four proposals totaling approximately $29,000. Brief descriptions of the four projects funded in 2012 follow.

Clarification of the taxonomy of Indus and Ganges river dolphins: Are they different species? (Downstream Research Group, Macon, Georgia): The taxonomic status of Indus (*Platanista gangetica minor*) and Ganges (*Platanista gangetica gangetica*) river dolphins recently changed from separate species to subspecies. This study examines differentiation in mitochondrial DNA and skeletal morphology to determine potential species divergence. The investigator will build upon earlier studies on the skull morphology of Indus and Ganges dolphins. The Marine Mammal Commission funded this grant to help clarify the taxonomy of the Indus River dolphin and the Ganges River dolphin. The reclassification of Indus and Ganges dolphins as separate species could have significant positive implications for their conservation.

A workshop to identify and determine the research and monitoring required to resolve significant uncertainties concerning the effects of the Antarctic toothfish fishery and climate change on the Ross Sea ecosystem (H. T. Harvey & Associates, Los Gatos, California): The commercial fishery for Antarctic toothfish (*Dissostichus mawsoni*) (also known as Chilean sea bass) may be indirectly affecting populations of Weddell seals (*Leptonychotes weddellii*) and killer whales (*Orcinus orca*), which prey on Antarctic toothfish in the Ross Sea. Ongoing and possible future changes in regional climate due to global warming could affect the toothfish and marine mammal populations as well as other ecosystem components. The Commission and Scientific Committee established by the Convention for the Conservation of Antarctic Marine Living Resources are responsible for guaranteeing that target fish populations do not decline as a result of the toothfish fishery and that the ecological relationships between harvested, dependent, and related populations of Antarctic marine living resources are maintained. The Marine Mammal Commission funded this grant to support a workshop to determine changes that may need to be undertaken in assessing, monitoring, and managing the Ross Sea toothfish fishery.

Estimation of minimum relative abundance values of endangered large whales in areas with low survey effort off the northeast Atlantic states (University of Rhode Island, Narragansett, Rhode Island): Industrial Economics, Inc., under contract to the National Marine Fisheries Service, has developed a model to assess the potential risk of entanglement of endangered whales in vertical lines from gillnet and trap/pot fisheries along the U.S. Atlantic coast from Maine to Florida. The investigator will undertake analyses to produce minimum values for sightings-per-unit-effort cells where, based on limited survey effort, values are currently estimated at zero. The Marine Mammal Commission funded this grant to provide a more accurate reflection of entanglement risks and conservation benefits of proposed management actions in waters off the northeastern United States.

Support for publication of *Right Whale News*, 2012–2013 (Associated Scientists at Woods Hole, Woods Hole, Massachusetts): *Right Whale News* is a quarterly newsletter advocating for the recovery of the North Atlantic right whale. The newsletter is distributed electronically to more than 600 subscribers around the world and provides commentary, publication summaries, meeting notices, and notices of upcoming events regarding the species. Associated Scientists at Woods Hole are responsible for publica-

1 www.mmc.gov

tion of the newsletter, and the New England Aquarium and North Atlantic Right Whale Consortium maintain the mailing list and website. The grant from the Marine Mammal Commission provided partial support for the publication of four issues of *Right Whale News*.

Survey of Federally Funded Marine Mammal Research and Conservation

Title II of the Marine Mammal Protection Act directs the Marine Mammal Commission to undertake a continuing review of "research programs conducted or proposed to be conducted under the authority of the Act." Accordingly, the Commission conducted an annual survey of federally funded marine mammal research and studies from 1974 to 2000.

Following several years during which the survey was not conducted, the Commission, in consultation with other federal agencies, undertook a redesign of the survey. In 2010 the Commission reinitiated the survey using a customized online application to gather data on marine mammal research and conservation activities conducted or supported by federal agencies in fiscal year 2009. The survey asked federal agencies[2] to describe their marine mammal-related programs, projects, and grants, as well as to provide information on the nature of the research, the species and areas studied, the threats and issues addressed, and the funding obligated.

Research was identified as occurring in the field, a laboratory, or captive facility and involving computer simulations, analyses of pre-existing databases, or integration of traditional Native American knowledge. Research topics included such things as anatomy, morphology, physiology, nutrition, metabolism, energetics, genetics, neurology, hearing, sound production, echolocation, dive physiology, cognition, parasitology, disease/health, and individual animal body condition. Research may have focused on natural history characteristics such as breeding systems, foraging patterns and diet, diving patterns, movements, home range, time budgets, or seasonality of various types of behavior. At the population level, it may have focused on such things as distribution, stock structure, genetic exchange, abundance, trends, population status, social structure, migration, demographic parameters including vital rates (growth, birth, and death rates), evolution, or taxonomy. At the ecosystem level, it may have focused on such things as prey abundance, distribution, and availability; competition; predator avoidance; and habitat selection/use. Conservation-oriented research could have focused on marine mammal/human conflicts such as fishery interactions, ship strikes, disturbance, entanglement in marine debris, direct taking, and habitat degradation. Finally, agency research could have involved the development, testing, and deployment of a range of scientific methods and technologies, such as line-transect, mark-recapture, or photo-identification, and the development and refinement of various types of tags, tracking devices, acoustic devices, tissue-sampling devices, analytical software, assessment models, or simulation software.

Conservation and protection activities often are aimed at managing human-related risks to marine mammals. They may involve the development of conservation regulations and policies, permitting of research and other activities that may take[3] marine mammals purposely or incidentally, development of mitigation and monitoring measures, enforcement, education and outreach, status reviews and listing decisions, recovery planning, section 7 consultations under the Endangered Species Act, co-management of subsistence hunting, stranding and entanglement response, rehabilitation, the application of new technologies/equipment (e.g., fishing gear), or management evaluation. Supporting activities such as administration, infrastructure development and maintenance, capital investment, information/database development and maintenance, and communications (e.g., workshops, conferences) also are important for marine mammal conservation and protection.

In 2011 the Commission downloaded the 2009 survey data, conducted error checking and correction, and began analysis of the data. At the end of 2012 a report of the results of the survey was nearing completion. Full details on the methodology, quality

2 The term "federal agencies" refers to federal departments, administrations, bureaus, services, offices, programs, institutions, commissions, etc.

3 "Take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

assurance and quality control, and results are available in the final report, which is available at http://mmc.gov/survey_ffr/2009_report.shtml. The following were the key findings, which reflect only the 2009 survey data, to that point:

- A total of $125.1M in funding for 445 projects was reported by agencies within the Departments of Commerce, Interior, Defense, and Health and Human Services, and the National Science Foundation, National Aeronautics and Space Administration, Smithsonian Institution, North Pacific Research Board, and Marine Mammal Commission.
    - The three agencies with lead responsibility for research and management of marine mammals (National Marine Fisheries Service, Fish and Wildlife Service, and U.S. Geological Survey) accounted for 47 percent ($59.3M) of the total funding reported.
    - The Navy, Army Corps of Engineers, and former Minerals Management Service (now Bureau of Ocean Energy Management), all of which are responsible for mitigating the impact of their activities and policies on marine mammals, accounted for 28 percent ($35.1M) of the total funding reported.
    - The Smithsonian's National Zoo accounted for $15.0M that was used to improve its seal and sea lion exhibit.
    - A number of other agencies provided the remaining $15.7M.
- Funding differed substantially by region.
    - The National Marine Fisheries Service directed 52 percent ($20.6M) of its region-specific funding to the Alaska Region, 20 percent ($8.0M) to the Northeast Region, 16 percent ($6.3M) to the Pacific Islands Region, and 4 percent ($1.5M) each to the Southwest, Southeast, and Northwest Regions.
    - The Fish and Wildlife Service and U.S. Geological Survey distributed their funds in accordance with the marine mammals they respectively manage and study: 68 percent ($4.1M) to the Alaska Region for the polar bear (*Ursus maritimus*), walrus (*Odobenus rosmarus*), and sea otter (*Enhydra lutris*); 23 percent ($1.4M) to the Southeast Region for the manatee; and 9 percent ($0.6M) to the Pacific and California/Nevada Regions for the sea otter.
    - The dispersal of funds by the Department of Defense and the Minerals Management Service also varied by region, reflecting the distribution of their activities or leasing programs in the Gulf of Mexico, off southern California, in the central Pacific (Navy), or in Alaska waters.
- Funding for marine mammals was directed according to a wide variety of objectives. Agencies allocated funding as follows:
    - 20 percent ($25.5M) on stock assessment and population dynamics;
    - 19 percent ($24.4M) on studies of marine mammal biology and ecology;
    - 13 percent ($16.8M) on education and outreach;[4]
    - 13 percent ($15.8M) on interactions with human activities other than fisheries, such as shipping, military testing and training, and seismic surveys;
    - 7 percent ($8.6M) on animal health;
    - 7 percent ($8.4M) on fisheries interactions; and
    - 6 percent ($8.0M) on technology development.
- The remaining 15 percent was dispersed among a variety of other objectives.
- Agencies directed 79 percent ($98.5M) of all funding to projects focused on one or more of 72 individual species or 14 species groups. The remaining 21 percent ($26.6M) supported projects of general benefit to marine mammals.
    - By species, total funding varied from about $4M to $8M each for North Atlantic right whale (*Eubalaena glacialis*), Steller sea lion (*Eumetopias jubatus*),

4 The $16.8M for education and outreach was higher than might have been expected because of the National Zoo's $15M capital investment in its seal and sea lion exhibits.

Hawaiian monk seal (*Monachus schauinslandi*), humpback whale (*Megaptera novaeangliae*), West Indian manatee (*Trichechus manatus*), and Cuvier's beaked whale (*Ziphius cavirostris*).

- Funding for an additional 18 species or species groups exceeded $1.0M each.
- Nine pinniped species—Steller and California (*Zalophus californianus*) sea lions; northern fur seal (*Callorhinus ursinus*); Hawaiian monk, harbor (*Phoca vitulina*), gray (*Halichoerus grypus*), bearded (*Erignathus barbatus*), and Weddell (*Leptonychotes* weddellii) seals; and walrus (*Odobenus rosmarus*)—accounted for $39.5M.[5]
- Six large whales—North Atlantic right, humpback, fin (*Balaenoptera physalus*), sperm (*Physeter macrocephalus*), bowhead (*Balaena mysticetus*), and gray (*Eschrichtius robustus*) whales—accounted for $20.8M.
- Among odontocetes (toothed whales, dolphins, and porpoises), Cuvier's and Blainville's (*Mesoplodon densirostris*) beaked whales and the general beaked whale group; common bottlenose dolphin (*Tursiops truncatus*); killer whale (*Orcinus orca*), beluga (*Delphinapterus leucas*), and sperm whale and the general sperm whale group; and pilot whales (*Globicephala melas* and *G. macrorhynchus*) accounted for $18.6M.
- Three species studied by the U.S. Geological Survey and managed by the Fish and Wildlife Service—West Indian manatee, polar bear (*Ursus maritimus*), and sea otter (*Enhydra lutris*)—accounted for $11.1M.
- Thirty species and six species groups had funding at less than $0.1M each.

- Of the $93.9M in funding associated with individual species, agencies directed 61 percent ($57.0M) toward species listed as endangered or threatened under the Endangered Species Act or designated as depleted or strategic under the Marine Mammal Protection Act:
  - $44.1M for 19 endangered species;
  - $5.8M for three threatened species; and
  - $7.1M for the three species designated as depleted or strategic.
- Among the endangered species, funding was exceptionally low for the North Pacific right whale ($0.5M), blue whale (*Balaenoptera musculus*) ($0.2M), and sei whale (*B. borealis*) (<$0.1M).

Following the fiscal year 2009 survey, the Commission made a number of changes to the survey design, and in May and June 2012 the Commission conducted a survey of federal marine mammal funding for fiscal years 2010 and 2011. At the end of 2012 the Commission was beginning to process the data submitted during that survey.

5 This amount was bolstered by the National Zoo's $15 million investment in its seal and sea lion exhibit.

Chapter X

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, including 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 can be issued for the taking of marine mammals in the course of educational or commercial photography. The Marine Mammal Commission reviews all such permit applications, including amendment requests. In addition, the Commission reviews permit applications and amendment requests involving marine mammals under the Antarctic Conservation Act of 1978, 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 Act also allows the National Marine Fisheries Service and the Fish and Wildlife Service to grant authorizations for scientific research that involves taking only by Level B harassment (i.e., any act of pursuit, torment, or annoyance that has the potential to disturb but not injure a marine mammal or marine mammal stock). In 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 discussed in Chapter VII.

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; (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 a copy of the application to the Marine Mammal Commission for review; (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—at which time, the Service would respond to the Commission's recommendations if it did not implement them. 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 arrangements.

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 for the original permit application if the amendment would (1) extend the duration of the research beyond 12 months, (2) result in the taking

of additional numbers or species of animals, (3) increase the type and number of takes or risk of adverse impact, or (4) change or expand the location of the research. The Commission reviews all proposed amendments to permits except those that the National Marine Fisheries Service or the Fish and Wildlife Service considers to be of a minor nature (that is, they would not have any of the previously mentioned effects).

During 2012 the Commission reviewed 35 permit applications submitted to the National Marine Fisheries Service and 10 permit applications submitted to the Fish and Wildlife Service. Of the applications received from the National Marine Fisheries Service, 29 were for scientific research or enhancement, 2 were for public display, and 4 were for commercial/educational photography. Of the applications received from the Fish and Wildlife Service, eight were for scientific research or enhancement and two were for public display. In addition, the Commission reviewed 12 permit amendment requests submitted to the Services (9 to the National Marine Fisheries Service and 3 to the Fish and Wildlife Service). In 2012 the Commission also reviewed two permit applications for research in the Antarctic that were submitted to the National Science Foundation for authorization under the Antarctic Conservation Act. In general, the Services and the National Science Foundation adopted most of the Commission's recommendations concerning these permit actions. The proposed activities, the Commission's recommendations, and the agencies' responses to the Commission's recommendations are summarized in Appendix A.

Among the 2012 permit applications was a request from the Georgia Aquarium to the National Marine Fisheries Service for the importation of 18 wild-caught beluga whales from Russia for public display purposes. The aquarium proposed to house some of the whales at its facility (Figure X-1) and loan the others to Mystic Aquarium, Shedd Aquarium, and SeaWorld facilities in Orlando, San Anto-

Figure X-1. Beluga whale at the Georgia Aquarium. (Photo courtesy of the Georgia Aquarium)

nio, and San Diego. The purpose of the proposed importation was to display the whales to the public, use them to promote beluga whale conservation through public viewing opportunities and education, and increase the probability that the collection of beluga whales maintained in captivity in North American facilities would become self-sustaining (i.e., would not require collection of additional whales from the wild).

The subject whales were caught from the Sea of Okhotsk in 2006, 2010, and 2011 and have been housed at a Russian marine mammal research station since their capture. Based on the analyses in the application and supporting documentation, the Sakhalin-Amur population from which the animals were taken should be able to sustain the removal of the 18 whales. The Georgia Aquarium, in association with four other aquaria, had provided substantial support for studies to assess the Sakhalin-Amur population. In addition, it did not appear that the whales were taken in violation of U.S. or Russian laws.

The aquarium indicated in its application that it (1) is open to the public on a regularly scheduled basis with access that is not limited or restricted other than by an admission fee, (2) offers an educational program based on professionally recognized standards, and (3) holds an exhibitor's license issued by the U.S. Department of Agriculture under the Animal Welfare Act, all of which fulfill related requirements under the Marine Mammal Protection Act.

The Commission had concerns regarding aspects of the transport plan, which included approximately 30 hours of travel via ground and air from Russia to the facilities in the United States, including a layover and transfer of the belugas to different aircraft in Belgium. Accordingly, the Commission recommended that prior to issuing the permit the National Marine Fisheries Service confer with the Animal and Plant Health Inspection Service to ensure that Georgia Aquarium's plans and facilities for transporting and maintaining the whales met the requirements established under the Animal Welfare Act and other applicable laws and were adequate to provide for the whales' health and well-being. The Commission further recommended that the Service (1) condition the permit to require the aquarium to develop, if it had not already done so, a contingency plan that would allow for removing the beluga whales from the transport containers and placing them into a less stressful environment and providing veterinary care if (a) the Belgium transfer or any flight is disrupted or delayed or (b) any whale shows signs of clinical illness during transport; (2) strongly encourage the aquarium to continue its support for research on the Sakhalin-Amur population of beluga whales to obtain a more accurate and precise assessment of its genetic status, its abundance and trend, and the significance of other risk factors that may affect its conservation status; and (3) strongly encourage the aquarium to advance a program of public education and outreach on the conservation of belugas worldwide, especially pertaining to the impact of increasing human activities on the sub-Arctic and Arctic populations. The Service held a public meeting regarding importation of the belugas in October 2012; however, it had not made a decision whether to issue or deny the permit by the end of the year.

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 involves taking by Level B harassment only. In 2012 the National Marine Fisheries Service issued five letters of confirmation under the general authorization and amended three others. 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 June 1999 testimony before the House Resources Committee's 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 Inte-

rior because these agencies believe that amending the Endangered Species Act would be a more appropriate way to implement such a change.

Incidental 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 invoke this provision when the number of animals likely to be affected is "small" and the impact on the recruitment and survival of the affected species or stocks is 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 an incidental take authorization when the taking will be by 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 of up to one year. Both types of authorizations may be renewed.

During 2012 the Commission reviewed 35 requests for incidental take authorizations—8 under section 101(a)(5)(A) and 27 under section 101(a)(5)(D). The proposed activities, the Commission's recommendations, and the agencies' responses to the Commission's recommendations are summarized in Appendix A.

Title 10 Authorizations

10 U.S.C. § 7524 authorizes the Navy to take up to 25 marine mammals each year for national defense purposes (a) with the concurrence of the Secretary of Commerce and after consulting with the Marine Mammal Commission, (b) if the marine mammal is "captured, supervised, cared for, transported, and deployed in a humane manner consistent with conditions established by the Secretary of Commerce," and (c) if the marine mammal is not a member of a species listed as endangered or threatened under the Endangered Species Act. The Navy primarily uses bottlenose dolphins and sea lions to support its various defense missions and needs. California sea lions are considered particularly useful in supporting mine warfare countermeasures and anti-terrorism missions. The Navy generally obtains a few non-releasable sea lions each year from rehabilitation facilities.

In 2012 the Navy issued a draft environmental assessment that evaluated the possible collection of up to 30 sea lions during a three-year period for its program. Because the Navy needs to collect animals that are relatively young and therefore more trainable, the primary candidates for collection are either young of the year on rookeries or young animals that have stranded on California beaches and have been rehabilitated at a stranding facility. The Navy's assessment considered four alternatives—

1. collecting young sea lions from rookeries, selecting only animals that appear to be compromised by illness or poor condition;
2. collecting young sea lions from rookeries, selecting only animals that appear to be healthy;
3. collecting young sea lions from rookeries, selecting only young sea lions that are relatively isolated on rookeries to minimize disturbance associated with the collection activities; and
4. obtaining releasable sea lions from stranding facilities that participate in the National Marine Fisheries Service's Marine Mammal Health and Stranding Response Program.

The Commission reviewed the applicable documents and recommended that the Navy implement alternative 1—collecting young sea lions that appear to be compromised or in poor condition. It based that recommendation on multiple reasons, including that many of the young sea lions on rookeries will not survive their first year; experienced biologists often can identify young sea lions that have a reduced chance of survival based on their size and condition; and collection of those animals will have the least, or no, effect on the overall population. The Commission also concluded that the fourth alternative is less than ideal because it does not ensure a reliable source of sea lions, may not be satisfactory to stranding facilities that seek to return as many sea lions as possible to the wild, and could result in competition between the Navy and other facilities seeking to acquire sea lions for public display purposes.

Similarly, the National Marine Fisheries Service stated in a 23 November letter to the Navy that it continues to support the collection of young sea lions from San Nicolas Island, which could be accomplished by alternatives 1–3. The Service also noted that taking releasable animals from the Marine Mammal Health and Stranding Response Program would be counter to the intent of the stranding program (i.e., returning rehabilitated marine mammals back to the wild), because retention of releasable marine mammals has been viewed with concern by stranding network members and is an issue currently under litigation.

Those concerns are both philosophical and economic. Many stranding network members, animal welfare groups, and members of the public are opposed to the retention of otherwise releasable rehabilitated marine mammals for any purpose. In addition, stranding network members have expressed concern that providing releasable animals for permanent placement at long-term care facilities may negatively affect their volunteer and donor bases that expect releasable animals to be returned to the wild. Considerable time, effort, and financial resources are invested by the stranding network members to prepare marine mammals to be returned to the wild. Although the Service understood that the Navy was interested in partnering with stranding facilities to acquire releasable sea lions, it recommended that the Navy use its congressional authority provided under 10 U.S.C. § 7524 to collect animals from the wild for national defense purposes. By the end of 2012 the Navy had not issued a finding of significant impact or requested concurrence from the Service regarding its proposed acquisition of sea lions under 10 U.S.C. § 7524.

Appendix A

2012 MARINE MAMMAL COMMISSION RECOMMENDATIONS AND AGENCY RESPONSES

3 January

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 10 February 2012, consistent with the Commission's recommendation.

18 January

To: National Marine Fisheries Service

Issue: Application for a research permit from Pacific Islands Fisheries Science Center 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, but condition it to require the Center to (1) minimize disturbance of the subject animals by exercising caution when approaching animals, particularly female-calf pairs, and stopping an approach if any evidence indicates that the activity is interfering with female-calf behavior, feeding, or other vital functions and allows tagging of females with all but neonate calves (e.g., calves with fetal folds) and (2) 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 Service. 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 data and samples shared, verify the experience of each co-investigator, and condition the permit to allow them to oversee certain procedures (e.g., biopsy sampling, suction-cup tag deployment, dart tag deployment) only if they have demonstrated proficiency with those procedures. In addition, the Commission recommended that the Service advise the Center of the need to obtain permits under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) prior to importing or exporting

parts from marine mammals listed in the Convention's appendices and to consult with the relevant entity (e.g., National Marine Sanctuary, National Ocean Service, Marine National Monument) and obtain any required permits prior to conducting the proposed activities in a sanctuary or monument.

Agency Response: The Service issued the permit on 23 May 2012, consistent with the Commission's recommendations.

31 January **To:** National Marine Fisheries Service

Issue: Application for a research permit from Kenneth Balcomb, Ph.D., to conduct research on cetaceans, primarily killer whales, in the eastern North Pacific during a five-year period

Recommendation: The Marine Mammal Commission recommends that the National Marine Fisheries Service issue the permit as requested, provided that it specifies within the take table the (1) total number of takes for each species or stock, (2) the total number of individuals within that species or stock that could be taken, and (3) the total number of times each individual within that species or stock could be taken. The Commission also recommended that the Service condition the permit to require Mr. Balcomb to develop, implement, and annually report the results of an assessment method that would help him detect possible adverse effects of his research on the whales and require Mr. Balcomb to minimize disturbance of the subject animals by exercising caution when approaching animals, particularly female-calf pairs, and stopping an approach if any evidence indicates that the activity is interfering with female-calf behavior, feeding, or other vital functions. In addition, the Commission recommended that the Service advise Mr. Balcomb of the need to obtain additional permits from the relevant entities (e.g., the National Marine Sanctuary, the specific state, National Oceanic and Atmospheric Administration [NOAA], or the U.S. Fish and Wildlife Service) prior to conducting the proposed activities in a sanctuary, marine protected area, or wildlife refuge.

Agency Response: The Service issued the permit on 5 June 2012, consistent with the Commission's recommendations. It noted that Mr. Balcomb submits annual, final and incident reports, which contain tabular and narrative components that address effects of the research.

3 February **To:** National Marine Fisheries Service

Issue: Application for a research permit from Gregory Walker to conduct unmanned aerial surveys of Steller sea lions in Alaska during a one-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the requested permit, provided that it is conditioned to require (1) the implementation of sufficient monitoring to ensure that disturbances are detected and recorded and (2) Mr. Walker to minimize the potential impacts of sea lion disturbance by exercising caution when approaching female/pup pairs and stopping such an approach if there is evidence that the activity may be interfering with female/pup behavior, nursing, or other vital functions.

Agency Response: The Service denied the permit on 23 February 2012. It did not believe that watching videos or live-video feed for two days, as the applicant has done, constitutes sufficient experience or expertise to reliably and accurately detect and interpret behaviors indicative of disturbance. The Service suggested that Mr. Walker partner with the National Marine Mammal Laboratory and have them submit the application, which he could work

under until such time as he had sufficient experience and expertise to apply for his own permit. Therefore, Mr. Walker listed Lowell Fitz as a co-investigator, but the Service stated that neither the co-investigator nor other observers would have authority to require the permit holder (Mr. Walker) to make changes in protocols that they deem necessary to avoid or minimize adverse impacts. In addition, the Service noted that Mr. Walker failed to demonstrate that the study objectives cannot be achieved by testing feasibility on non-rookeries or on a species that is not listed as endangered. However, Mr. Walker proposed to work at non-rookeries initially and after it was determined that disturbance from the aircraft was minimal, the study would occur at rookeries. Mr. Walker also had tested the aircraft during ice seal surveys. The Service then noted that if the permit were to require surveys to stop if there is evidence of interference with "vital functions" then it should never allow them to begin in the first place. "Vital functions" is a broad term encompassing numerous physiological and biochemical processes related to homeostasis, and could include any normal behaviors such as resting, mating, feeding, and grooming.

The Humane Society of the United States had similar recommendations to the Commission but also suggested that it is necessary for the Service to produce a supplemental National Environmental Policy Act analysis that determines that issuance of the permit would not add to the adverse impacts already predicted by the programmatic environmental impact statement. As such, the Service stated that undertaking a supplemental analysis to evaluate whether the environmental impacts of the proposed permit are within the limits established in the preferred alternative of the programmatic environmental impact statement and record of decision would preclude issuance of permit before Mr. Walker's proposed field deployment.

3 February **To:** National Marine Fisheries Service

Issue: Application for a research permit from Alejandro Acevedo-Gutiérrez, Ph.D., to conduct research on harbor seals in Washington waters during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, but condition it to (1) restrict Dr. Acevedo-Gutiérrez from conducting kayak experiments during the peak pupping season (i.e., from May through June) and (2) require him to minimize the potential impacts of harbor seal disturbance by exercising caution when approaching female/pup pairs (i.e., during all other months) and stopping such an approach if there is evidence that the activity may be interfering with female/pup behavior, nursing, or other vital functions. The Commission also recommended that the Service advise Dr. Acevedo- Gutiérrez of the need to obtain additional permits from the relevant entity (e.g., NOAA, the U.S. Fish and Wildlife Service, the state of Washington) prior to conducting the proposed activities in a marine protected area, wildlife refuge, or state park.

Agency Response: The Service issued the permit on 5 March 2012, consistent with the Commission's recommendations.

6 February **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

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the final rule, but require the Navy to (1) monitor for 60 minutes before resuming SURTASS LFA sonar transmissions after a delay or suspension related to the sighting of a marine mammal in the LFA mitigation or buffer zones unless the Navy observes the animal leaving those zones and (2) monitor for a minimum of 30 minutes after SURTASS LFA sonar transmissions cease using visual observation (if during daylight hours as defined in the proposed rule), passive acoustics, and the active sonar system.

Agency Response: The Service issued the final rule on 20 August 2012, consistent with neither of the Commission's recommendations. The Service believed that requiring the Navy to monitor for 60 minutes (i.e., an additional 45 minutes from the 15-minute requirement) is not warranted due to the proven effectiveness of the active sonar system, because it provides 24-hour, all-weather, active acoustic monitoring of the 180-dB re 1 µPa mitigation zone and the 1-km buffer zone around that mitigation zone. In addition, the Service considered the likelihood of the Navy not detecting a marine mammal within the mitigation zone to be extremely small (i.e., less than 1 percent) based on nine years of monitoring data. Furthermore, the Navy's mitigation measures reflect a careful balancing of the likely benefit of any particular measure for marine mammals with the likely effect of that measure on personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. The Service stated that few marine mammal detections (i.e., by visual observation, passive acoustics, or active sonar monitoring) have occurred during the 15-minute post-transmission period in the last nine years. It did not believe that imposing additional data collection requirements would meaningfully increase knowledge of the species or SURTASS LFA sonar impacts to warrant the additional time and cost expenditures. Moreover, the Service stated that the Navy must balance the small benefits gained by obtaining this incremental amount of additional data against the impact on fleet operations that the additional delay would necessarily entail. Therefore, it did not require a 30-minute post-monitoring period.

7 February **To:** National Marine Fisheries Service

Issue: Application for a photography permit from Shane Moore, Moore & Moore Films, to harass killer and gray whales during filming activities in the eastern Aleutian Islands, Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it is conditioned to require Mr. Moore to (1) monitor and report all cases when filming activities lead to sufficient disturbance that the whales alter their behavior or otherwise exhibit strong response to filming activities and the boats and (2) cease

filming a particular whale or whales if the whale or whales appear to be unduly disturbed by the activity.

Agency Response: The Service issued the permit on 12 April 2012, consistent with the Commission's recommendations.

7 February **To:** National Marine Fisheries Service

Issue: Application for a photography permit from NHK Enterprises, Inc., to harass killer and gray whales during filming activities in the eastern Aleutian Islands, Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, but condition it to require NHK Enterprises to (1) monitor and report all cases when

filming activities lead to sufficient disturbance that the whales alter their behavior or otherwise exhibit strong response to filming activities and the boats and (2) cease filming a particular whale or whales if the whale or whales appear to be unduly disturbed by the activity. The Commission also recommended that the Service advise NHK Enterprises of the need to obtain additional permits from the Alaska Maritime Wildlife Refuge before filming in the refuge.

Agency Response: The Service issued the permit on 30 March 2012, consistent with the Commission's recommendations.

9 February **To:** National Marine Fisheries Service

Issue: Application for a research permit from Dorian Houser, Ph.D., to conduct research on hearing sensitivities of cetaceans in the United States during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided it advises Dr. Houser of the need to have his Institutional animal Care and Use Committee (IACUC) approve his research protocols prior to initiating the proposed activities.

Agency Response: The Service issued the permit on 29 March 2012, consistent with the Commission's recommendation.

9 February **To:** National Marine Fisheries Service

Issue: Application for a research permit from Matson's Laboratory to receive, possess, import, export, and conduct analyses on pinniped teeth during a five-year period.

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it advises Matson's Laboratory of the need to obtain all necessary permits under CITES before importing or exporting pinniped teeth or microscopic slides of teeth from those species included in the Convention's appendices.

Agency Response: The Service issued the permit on 26 March 2012, consistent with the Commission's recommendation.

15 February **To:** Bureau of Ocean Energy Management

Issue: Draft environmental impact statement for the 2012–2017 Gulf of Mexico leasing program

Recommendation: The Commission recommended that the Bureau of Ocean Energy Management (1) review the Commission's enclosed statement of research needs; (2) consult NOAA, the U.S. Fish and Wildlife Service, and the Commission on long-term, high priority research and monitoring needs related to the Deepwater Horizon oil spill; and (3) incorporate those priorities into its Environmental Studies Program. The Commission also recommended that the Bureau work with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, academia, and industry partners to develop a comprehensive monitoring program for the Gulf of Mexico ecosystem, including its marine mammal populations and revise its environmental impact statement to include alternative strategies for seismic studies that

would provide opportunities for avoiding unnecessary redundancy and thereby minimizing the associated ecosystem disturbance.

Agency Response: The Bureau issued its final environmental impact statement in July 2012, consistent with some of the Commission's recommendations. The Bureau stated that although it undertakes studies on a number of resources and issues related to the outer continental shelf, the decisions regarding which studies to fund and pursue are outside of the scope of the environmental impact statement. The Bureau did indicate that it was working with the National Marine Fisheries Service on an environmental impact statement for seismic activities in the Gulf of Mexico that will include consideration of alternative technologies, as well as other strategies to minimize potential impacts to natural resources.

21 February **To:** National Marine Fisheries Service

Issue: Application from Ocean Renewable Power Company Maine, LLC, to take small numbers of marine mammals by harassment incidental to the installation of a tidal energy turbine in Cobscook Bay, Maine

Recommendation: The Commission recommended that the National Marine Fisheries Service defer issuance of the requested incidental harassment authorization until it evaluates the potential effects of construction, installation, and subsequent operation of the turbine and use that information as a basis for (1) determining the potential for marine mammal injury or mortality, (2) designing mitigation and monitoring measures to minimize injury and mortality caused by direct interactions, and (3) determining whether the anticipated takes are expected to have negligible impacts on marine mammal species and stocks. If any incidental take authorization is issued for these activities, the Commission recommended that the Service authorize the taking of harbor seals and gray seals by both in-water and in-air harassment and, if the Service does not authorize in-air takes of those two species, require Ocean Renewable Power Company to shut down pile-driving activities whenever a harbor seal or gray seal is within the in-air Level B harassment zone. The Commission also recommended that the Service require the Company to (1) monitor the presence and behavior of marine mammals for 30 minutes before, during, and for 30 minutes after all impact and vibratory pile-driving activities; (2) record distances to observed marine mammals and document their behavior within the entirety of the Level B harassment zone for vibratory pile driving; and (3) 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.

Agency Response: The Service issued the incidental harassment authorization on 8 March 2012, consistent with none of the Commission's recommendations. The Service disagreed with deferring the authorization because the Company requested authorization for incidental takings subject to a specified activity (i.e., pile driving). NMFS has not received an IHA request for incidental takings subject to further construction, installation, or subsequent operation of the tidal turbine even though the turbines would be installed later this year. The Service further stated that information regarding operating tidal turbines does not suggest the need for an incidental take authorization. However, if the Company, not the Service, determines that there is a potential for further marine mammal harassment, they may choose to apply for another authorization.

The Service did not believe that in-air takes of pinnipeds were an issue because the closest haul-out is more than 6 nmi from the project area. It stated that animals within the in-air

zone would have already been taken by in-water disturbance and shutdown would not be needed but it did not specify that animals within the in-air zone would be taken both by in-water and in-air disturbance. In addition, the Service noted that observers would monitor 30 minutes before, during, and 30 minutes after all impact pile driving but only for three days during vibratory pile driving. It believes that the specified amount of monitoring would be sufficient to prevent the injury or mortality of marine mammals and to document behavioral responses of marine mammals to pile driving. It did not address specifically how the observers would monitor the entirety of the Level B harassment zone nor did it believe that monitoring during all soft-starts of vibratory impact pile driving was needed as stated previously.

27 February **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 northwest Pacific Ocean

Recommendation: The Commission recommended that, before issuing the requested incidental harassment authorization, 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 Northwest 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 (i.e., estimated by multiplying the best density estimate by a precautionary correction factor) rather than best densities and re-estimate the anticipated number of takes and 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). 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 maximum 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 all marine mammals within or entering the identified exclusion and buffer zones, and 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. The Commission then 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. Finally, 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 24 March 2012, 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. The Service also 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 best densities because it is confident in the assumptions and calculations used to estimate densities for this survey area. It has used best densities to estimate the number of incidental takes in other incidental harassment authorizations, and the results of the associated monitoring reports show that the use of the best estimates is appropriate for and does not refute the Service's negligible impact determinations. 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 the maximum dive time 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 noted that data from geophysical surveys are being compiled but are scant and it is unlikely that the information will result in any statistically robust conclusions for this particular seismic survey. In the long term, information regarding effectiveness may be provided.

28 February

To: National Marine Fisheries Service

Issue: Draft environmental impact statement on the effects of oil and gas activities in the Arctic Ocean

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) work with the Bureau of Ocean Energy Management to conduct supplemental activity-specific environmental analyses under the National Environmental Policy Act that provide detailed information on proposed seismic surveys and drilling activities and the associated environmental effects, (2) work with the Bureau and industry to ensure that the necessary information is available to estimate the number of takes as accurately as possible given current methods and data, (3) encourage the Bureau to make activity-specific analyses available for public review and comment rather than issuing memoranda to the file or categorical exclusions that do not allow for public review/comment, and (4) encourage the Bureau to make those analyses available for public review and comment before the Service makes its final determination regarding applications for incidental take authorizations. The Commission also recommended that the Service work with the Bureau to expand the draft environmental impact statement to include a broader range of alternatives that ensure that oil and gas activities have no more than a negligible impact on marine mammal species and stocks and will not have adverse impacts on the Alaska Native communities that depend on the availability of marine mammals for subsistence and identify its preferred alternative, including the rationale for its selection. In addition, the Commission recommended that the Service work with the Bureau to estimate the site-specific acoustic footprints for each sound threshold (i.e., 190, 180, 160, and 120 dB re 1 μPa) and the expected number of marine

mammal takes and work with the Bureau and other entities as appropriate to establish and fully support programs designed to collect and synthesize the relevant scientific information and traditional knowledge necessary to evaluate and predict the long-term and cumulative effects of oil and gas activities on Arctic marine mammals and their environment. The Commission recommended that the Service work with the Bureau to incorporate a broader list of mitigation measures that would be standard for all oil and gas-related incidental take authorizations in the Arctic region and include additional measures to verify compliance with mitigation measures and work with the Bureau and industry to improve the quality and usefulness of mitigation and monitoring measures. Finally, the Commission recommended that the Service work with the Bureau, U.S. Fish and Wildlife Service, U.S. Geological Survey, state of Alaska, North Slope Borough, Alaska Native organizations, academia, non-governmental organizations, and industry to develop a comprehensive, long-term monitoring program for the Arctic ecosystem, including its marine mammal populations.

Agency Response: The Service had not issued the final environmental impact statement by the end of 2012.

March 5

To: U.S. Fish and Wildlife Service

Issue: Draft national fish, wildlife, and plants climate adaptation strategy

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service and co-drafters modify the draft climate adaptation strategy to reflect clearly in the introduction that ongoing climate disruption is primarily human-caused and unlike periods of change in the historical or geological past and to include a biologically and ecologically realistic assessment of the potential for non-human species to adapt to the physical, chemical, and biological changes expected to occur as a result of climate disruption. The Commission also recommended that the strategy should (1) inform readers regarding the many types of barriers or obstacles there are to adaptation and the potential for adverse effects as species attempt to adapt, (2) include a biologically and ecologically realistic appraisal of our ability to influence or affect the resilience of wildlife populations or ecosystems, and (3) provide a realistic appraisal of our (a) capacity and willingness to protect the habitat that wildlife populations depend on now and the habitat that they will need as they attempt to adapt to climate change and (b) current and future ability to recover species and restore ecosystems depleted or degraded by climate disruption. In addition, the Commission recommended that the strategy include a strong call for the research needed to characterize and manage cumulative effects, and the resources needed to support that research and include in its purpose and vision statements an emphasis on the need for innovation. Finally, the Commission recommended that the strategy incorporate more of the relevant scientific literature on the topic of organism or ecosystem adaptation to climate change.

Agency Response: The Service has not issued a final strategy by the end of 2012.

12 March

To: U.S. Fish and Wildlife Service and National Marine Fisheries Service

Issue: Draft policy to interpret the phrase "significant portion of its range" as used in the Endangered Species Act to align the Services' interpretation with court decisions on the phrase's meaning and resolve ambiguities in the statutory language

Recommendation: The Commission recommended that the U.S. Fish and Wildlife and National Marine Fisheries Services (1) revise the draft policy by defining the word

"significant" in the phrase "significant portion of its range" (1) so that a portion is not considered significant only if the loss of that portion places the entire species in danger of extinction and (2) in a way that recognizes the ecological and/or evolutionary significance of various parts of a species' range to the species and the ecosystem and that does not diminish the species' resilience or potential to adapt in response to rapidly changing environmental conditions or rule out the possibility that areas that do not now constitute good habitat might become so as a consequence of the same processes that are causing the loss or degradation of presently occupied areas. The Commission also recommended that the Services revise the draft policy to ensure that it gives the Services the ability to apply its expertise and exercise reasonable discretion in determining what constitutes a significant portion of a species' range. In addition, the Commission recommended that the Services expand the draft policy's interpretation of "significant" to cover not only species that are in danger of extinction but also those likely to become so in the foreseeable future and give priority to listing a species range-wide on the basis of its representing a significant portion of the species' range even when a distinct population segment also qualifies for listing on that basis.

Agency Response: The Service had not issued the final policy by the end of 2012.

15 March

To: National Marine Fisheries Service

Issue: Application for a research permit from James Harvey, Ph.D., to conduct research on harbor seals in California, Oregon, Washington, and Alaska during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to ensure that activities are coordinated with other permit holders who might be doing similar research to avoid duplicative research and unnecessary disturbance of animals.

Agency Response: The Service issued the permit on 16 May, consistent with the Commission's recommendation.

19 March

To: National Marine Fisheries Service

Issue: Application for a research permit from Jooke Robbins, Ph.D., to conduct research on cetaceans species in the Gulf of Maine, Atlantic Ocean, Gulf of Mexico, and Caribbean Sea during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to require Dr. Robbins to minimize disturbance of the animals by exercising caution when approaching animals, particularly female-calf pairs, and stopping an approach if any evidence indicates that the activity is interfering with female-calf behavior, feeding, or other vital functions and 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 Service. The Commission also recommended that the Service advise Dr. Robbins of the need to have her IACUC review and approve the proposed research protocols prior to initiating the research activities and to consult with the relevant entity (e.g., National Marine Sanctuary, National Ocean Service, National Park Service, Tres Palmas Marine Reserve) and obtain any required authorizations prior to conducting the proposed research activities in a sanctuary, critical habitat area, seashore, or reserve.

Agency Response: The Service issued the permit on 4 September 2012, consistent with most of the Commission's recommendations. However, the Service did indicate that review and approval by an IACUC is not a condition of permit issuance under the Marine Mammal Protection Act. Rather, it is a requirement of the Animal Welfare Act, which is under the jurisdiction of the U.S. Department of Agriculture.

19 March **To:** National Marine Fisheries Service

Issue: Application from Glenn VanBlaricom, Ph.D., to take small numbers of California sea lions, Pacific harbor seals, and northern elephant seals by harassment incidental to abalone research on San Nicolas Island, 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 10 October 2012, consistent with the Commission's recommendation.

19 March **To:** National Marine Fisheries Service

Issue: Amendment to an application for a research permit from The Whale Museum to change the principal investigator on its permit to conduct research on southern resident killer whales in Washington

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, subject to the recommendations from the Commission's 21 November 2011 letter. Those recommendations stipulate that the Service condition 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 advise 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 issued the permit on 5 June 2012, consistent with the Commission's recommendations.

20 March **To:** National Marine Fisheries Service

Issue: Application from the Navy to take marine mammals by harassment incidental to testing the AN/AQS-20A Mine Reconnaissance Sonar System (Q-20) in the Gulf of Mexico

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization but condition it to require the Navy to conduct its monitoring for at least 15 minutes prior to the initiation of and for at least 15 minutes after the cessation of Q-20 testing activities.

Agency Response: The Service issued the incidental harassment authorization on 27 July 2012, consistent with the Commission's recommendation.

23 March **To:** U.S. Fish and Wildlife Service

Issue: Application for a research permit from Mote Marine Laboratory to collect, conduct analyses on, and archive manatee blood samples during a five-year period

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 June 2012, consistent with the Commission's recommendation.

26 March **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 activities at the Russian River near Jenner, 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 21 April 2012, consistent with the Commission's recommendation.

27 March **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 to be conducted in the southeastern Pacific Ocean

Recommendation: The Marine Mammal Commission recommended that the National Marine Fisheries Service require Scripps Institution of Oceanography to re-estimate 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 and number of takes are not re-estimated, require Scripps to provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the southeastern Pacific Ocean on modeling that relies on measurements from the Gulf of Mexico. The Commission also recommended that the Service use species-specific maximum densities derived by multiplying the best density estimates by a precautionary correction factor and re-estimate the anticipated number of takes using that precautionary approach. In addition, the Commission recommended that the Service prohibit a 15-minute pause following the sighting of a mysticete or large odontocete in the exclusion zone and extend that pause to cover the maximum dive times of the species likely to be encountered prior to initiating ramp-up procedures and work with the National Science Foundation to analyze the data collected during ramp-up procedures to help determine the effectiveness of those procedures as a mitigation measure for geophysical surveys.

Agency Response: The Service issued the incidental harassment authorization on 4 May 2012, consistent with one of the Commission's recommendations. 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. The Service used best densities because it is confident in the assumptions and

calculations used to estimate densities for this survey area. It also stipulated that results of associated monitoring reports show that the past use of the best estimates was appropriate and has not refuted the Service's previous negligible impact determinations. The Service did not extend the monitoring period to the maximum dive time because the exclusion zone is small and the vessel is moving at 5 knots, 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 planned to work with the National Science Foundation and Scripps Institute of Oceanography to help identify the effectiveness of the mitigation measure for seismic surveys, but noted that data being compiled from geophysical surveys are scant and it is unlikely that the information will result in any statistically robust conclusions for this particular seismic survey. In the long term, information regarding effectiveness may be provided.

30 March

To: National Marine Fisheries Service and U.S. Fish and Wildlife Service

Issue: Draft revisions to the guidelines for assessing marine mammal stocks

Recommendation: The Commission recommended that the National Marine Fisheries Service and, where appropriate, the U.S. Fish and Wildlife Service (1) implement the approach recommended in the workshop report to estimate Nmin when the most recent surveys are out of date; (2) convene a national workshop to systematically review the status of stock identification efforts and to identify and prioritize the information needed to improve stock identification; and (3) adopt the recommendations of the workshop report to (a) include, when appropriate, a statement in each assessment explaining that bycatch data are not sufficient to estimate the bycatch rate with acceptable precision and (b) treat each such stock as strategic unless and until the data are sufficient to demonstrate that it is not. The Commission also recommended that the Services require stock assessment authors to set potential biological removal to zero in those cases that are not in accord with the commonly assumed potential biological removal framework and that involve stocks with no tolerance for additional human-related removals and include in its stock assessments comparisons of potential biological removal for feeding aggregations and estimate or apportion mortality and serious injury levels for each aggregation. In addition, the Commission recommended that the Services apply the total unassigned mortality and serious injury to each affected stock in both data-rich and data-poor cases involving taking of mixed stocks that cannot be or are not identified in the field; discourage the use of informed interpolation, require strong justification where it is used, and require that it be accompanied by reasonable measures of uncertainty associated with the interpolation; and require a summary of all human-caused mortality and serious injury in each stock assessment report. The Commission further recommended that the Services (1) consider any marine mammal stock that has declined by 40 percent or more to be strategic; (2) treat declining stocks with a greater than 50 percent probability of continuing to decline by at least 5 percent per year as strategic with the aim of reducing and eventually reversing the stock's rate of decline before designation as depleted is required; (3) include all relevant sources or measures of uncertainty in stock assessment documents; (4) require sections in stock assessment reports that identify and characterize non-lethal factors that may affect population status; (5) continue to encourage more exchange between Regional Scientific Review Groups to ensure consistency where needed and to promote useful and informative exchange among them; and (6) consider requiring in the Service's stock assessment report a brief summary paragraph or table on the historical trend of the stock in question.

Agency Response: The Services had not issued final guidelines by the end of 2012.

9 April

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 and associated number of marine mammal takes using operational and site-specific environmental parameters—if the exclusion and buffer zones and number of takes are not re-estimated, require the Observatory to provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the central Pacific Ocean on modeling that relies on measurements from the Gulf of Mexico. The Commission also recommended that the Service (1) use species-specific maximum densities derived by multiplying the best density estimates by a precautionary correction factor and (2) re-estimate the anticipated number of takes using that precautionary approach. In addition, the Commission recommended that the Service prohibit a 15-minute pause following the sighting of a mysticete or large odontocete in the exclusion zone and extend that pause to cover the maximum dive times of the species likely to be encountered prior to initiating ramp-up procedures and work with the National Science Foundation to analyze the data collected during ramp-up procedures to help determine the effectiveness of those procedures as a mitigation measure for geophysical surveys.

Agency Response: The Service issued the incidental harassment authorizations on 1 May 2012, consistent with one 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. The Service also 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 best densities because those densities were peer-reviewed, model-based estimates and are the best available information to estimate densities for the survey area. It has used best densities to estimate the number of incidental takes in other incidental harassment authorizations, and the results of the associated monitoring reports show that the use of the best estimates is appropriate for and does not refute the Service's negligible impact determinations. The Service did not extend the monitoring period to the maximum dive time because (1) the vessel would move 60 times away from the distance of the original 180–dB re 1 µPa exclusion zone (70 m) from the initial sighting; (2) extending the monitoring period for a relatively small exclusion zone would not meaningfully increase the effectiveness of observing marine mammals approaching or entering the exclusion zone for the full source level and would not further minimize the potential for take; (3) observers can monitor out to the horizon (10 km) and should be able to say with a reasonable degree of confidence whether a marine mammal would be encountered within this distance before resuming the two-GI airgun operations at full power; (4) it is unlikely that a submerged mysticete/large odontocete would move in the same direction and speed (roughly 5 knots) with the vessel for 30 minutes; and (5) there is a one in three chance that the animal would randomly surface within the exclusion zone. Lastly, the Service noted that data from

geophysical surveys are being compiled but are scant and it is unlikely that the information will result in any statistically robust conclusions for this particular seismic survey. In the long term, information regarding effectiveness may be provided.

9 April

To: National Marine Fisheries Service

Issue: Application for a research permit from the Virginia Institute of Marine Science to import samples from four phocid species 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 31 May 2012, consistent with the Commission's recommendation.

11 April

To: National Marine Fisheries Service

Issue: Application for a photography permit from Simon Nash to harass spinner dolphins during filming activities in waters near Midway Atoll in the Pacific Ocean during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to require Mr. Nash to (1) monitor and report all cases when filming activities lead to sufficient disturbance that the dolphins alter their behavior or otherwise exhibit strong response to filming activities, the vessel, and divers and (2) cease filming a particular dolphin or group of dolphins if it or they appear to be unduly disturbed by the activity.

Agency Response: The Service issued the permit on 24 May 2012, consistent with the Commission's recommendations.

11 April

To: National Marine Fisheries Service

Issue: Application from the Monterey Bay National Marine Sanctuary to take marine mammals by harassment incidental to commercial firework displays within Sanctuary waters

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the final rule but condition it to require the Sanctuary to conduct monitoring for at least 30 minutes on the evening of each fireworks display and the morning after.

Agency Response: The Service issued the final rule on 4 July 2012, consistent with the Commission's recommendation.

12 April

To: National Marine Fisheries Service

Issue: Application to amend a research permit from the Alaska Department of Fish and Game to add procedures when conducting research on harbor seals in Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment but advise the Department of the need to obtain approval from its IACUC before initiating the proposed captive study.

Agency Response: The Service issued the permit on 1 June 2012, consistent with the Commission's recommendation.

12 April **To:** National Marine Fisheries Service

Issue: Application from AMEC Environment & Infrastructure, on behalf of Fishermen's Atlantic City Windfarm, to take small numbers of marine mammals by harassment incidental to the installation of wind turbines off the New Jersey coast

Recommendation: The Commission recommended that the National Marine Fisheries Service require Fishermen's Atlantic City Windfarm to (1) recalculate the Level A and Level B harassment zones using the revised source level of 195 dB re 1 μPa at 10 m; (2) adjust the preliminary 1-km exclusion zone if it intends for the exclusion zone to encompass the Level B harassment zone or require shut down of pile driving if any species listed under the Endangered Species Act approaches or enters the revised Level B harassment zone; and (3) use the in-situ sound propagation measurements at 50 percent power to determine the distance to the Level B harassment threshold during power-down procedures. The Commission also recommended that the Service require Fishermen's Atlantic City Windfarm to clarify their strategy and explain how it will be sufficient for monitoring the entire Level B harassment zone; ensure that mitigation measures can be implemented effectively and the number of takes can be reported accurately; and specify that the proposed number of pinniped takes may occur by in-water and in-air harassment when the animals are near the sound source.

Agency Response: The Service issued the incidental harassment authorization on 1 May 2012, consistent with most of the Commission's recommendations. The Service indicated that multiple observers would be used to monitor the entire 1-km exclusion zone and would have sufficient view of the 107-m Level A harassment zone. Although the Level B harassment zone (2.6 km) would extend beyond the exclusion zone, the Service believed that the protected observers would be able to monitor part of this area and those observations would allow Fishermen's to estimate the total Level B harassment that occurs during pile driving.

20 April **To:** National Marine Fisheries Service

Issue: Extension or modification of the final rule that implements vessel speed restrictions to reduce the threat of vessel collisions with North Atlantic right whales

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) take immediate steps to extend the ship-speed rule until such time that the Service has sufficient data to assess the rule's effectiveness with an acceptable degree of confidence and (2) incorporate into the process for extending the rule an announcement of plans to (a) reconsider those measures contained in the original 26 June 2006 proposed rule (71 Fed. Reg. 36299) and (b) consider new protection measures for the Jordan Basin area of the Gulf of Maine.

Agency Response: The Service had not issued a proposed rule by the end of 2012 but intends to in early 2013.

25 April **To:** National Marine Fisheries Service

Issue: Application for a research permit from Colleen Reichmuth, Ph.D., to capture two bearded seals from the wild and maintain in captivity during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but first consult with the Animal and Plant Health Inspection Service to ensure that Dr. Reichmuth'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. The Commission also recommended that the Service advise Dr. Reichmuth of the need to (1) consult with personnel at the Polaria regarding maintaining bearded seals in captivity prior to the seals' capture and (2) have her University's IACUC review and approve her research protocols prior to initiating the proposed capture or research activities.

Agency Response: The Service issued the permit on 24 August 2012, consistent with the Commission's recommendations.

26 April

To: National Marine Fisheries Service

Issue: Application for a public display permit from the Saint Louis Zoo to import four harbor seals from Storybook Gardens in London, Ontario, Canada

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that, in consultation with the Animal and Plant Health Inspection Service, it 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.

Agency Response: The Service issued the permit on 30 May 2012, consistent with the Commission's recommendation.

30 April

To: National Marine Fisheries Service

Issue: Revised application from the Navy to take marine mammals incidental to military training operations at the Silver Strand Training Complex in San Diego, California

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) 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; (2) 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; (3) approve the authorization request contingent on the requirement that the Navy first use location-specific environmental parameters to re-estimate exclusion zones and then use in-situ measurements to verify and, if need be, refine the exclusion zones prior to or at the beginning of pile driving and removal; and (4) 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 (1) monitor for at least 30 minutes before, during, and at least 30 minutes after all underwater detonation and pile-driving and pile-removal activities; (2) take steps to ensure that the exclusion zones for pile driving and removal are clear of marine mammals for at least 30 minutes before activities can be resumed after a shutdown; (3) 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; (4) model the various proposed monitoring schemes to

determine what portion of the associated buffer zone is being monitored at any given time and the probability that dolphins entering that buffer zone would be detected before they get too close to the detonation site and (a) measure empirically the propagation characteristics of the blast (i.e., impulse, peak pressure, and sound exposure level) from the 5-, 10-, and 15- to 29-lb charges used in the proposed exercises and (b) use that information to establish appropriately sized exclusion and buffer zones; and (5) re-estimate the sizes of the buffer zones using the average swim speed of the fastest swimming marine mammal that inhabits the areas within and in the vicinity of the Complex where time-delay firing devices would be used and for which taking authorization is being requested. In addition, the Commission recommended that the Service advise the Navy that it should seek authorization for serious injury and incidental mortality in addition to taking by harassment and if not, require suspension of exercises if a marine mammal is seriously injured or killed and the injury or death could be associated with those exercises. Finally, the Commission recommended that the Service 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 issued the incidental harassment authorization on 18 July 2012, consistent with some of the Commission's recommendations. The Service believed that the Navy's density estimates and subsequent number of takes used in the application accurately reflect the densities presented in the references and are appropriate, although they concur that an error was made in Table 3–1 of the application regarding the sources of marine mammal densities. Further, the Service clarified that bottlenose dolphin density information was derived from the Service's Southwest Science Center sighting data for the coastal stock of that species and the assumption that that stock is normally thought to reside within 1 km of the coast. It also included four additional dolphin species in its authorization following the common dolphin mortalities that resulted from the use of time-delay firing devices during a training exercise at the Training Complex. The Service (via formal consultation regarding essential fish habitat by the Southwest Regional Office) required the Navy to conduct in-situ sound measurements during pile driving and removal, however, it did not require modeling location-specific modeling prior to authorization issuance. It also stated that the Navy's modeling and calculation of marine mammal takes from underwater detonations and pile driving and removal are consistent and conservative (i.e., for underwater detonations it rounded up if fractional animals were greater than or equal to 0.5 and rounded down otherwise and for pile driving and removal it rounded up for any fractional animals). Regarding the shut-down measure for pile driving and removal, the Service indicated that because the exclusion zone is so small, it believes that visual monitoring can be easily and effectively conducted to ensure that marine mammals have cleared the area after shutting down. Therefore, it would be unnecessary for the Navy to wait for 30 minutes before activities are resumed after a shutdown. In addition, the Navy stated that imposing a 30-minute clearance time would have significant negative training impacts, because there is only a small window allowed for those activities. For time-delay firing device mitigation measures, the Center for Naval Analysis examined those measures and determined that the probability of marine mammal detection based on the various schemes would be greater than 95 percent; however, it did not indicate if it incorporated the portion of the zone that is monitored at any given time within those calculations. The Navy also may include one-time in-situ measurements into its monitoring plan if such data can be collected within existing funding for monitoring and without impacts to training. However, the Service indicated that expansion of the buffer zones for activities that involve time-delay firing devices was not warranted because (1) the current buffer zones already incorporate an additional precautionary factor to account for

swim speeds above 3 knots and (2) buffer zones greater than 1,000 yards for events using 2 boats and 1,400/1,500 yards for events using 3 boats or 2 boats and 1 helicopter cannot be monitored or supported by the Navy's training units. Finally, the Service believed that the Navy has subsequently addressed the inadequacy in its original mitigation and monitoring measures and worked with it to develop a series of more robust measures to safeguard marine mammals from injury and mortality. Therefore, it considered the chance for injury and mortality very low due to the low densities and small exclusion zones. The Service has required that if there is clear evidence that a marine mammal is injured or killed as a result of the proposed Navy training activities (*e.g.*, instances in which it is clear that munitions explosions caused the injury or death), the Navy's activities would be immediately suspended and the situation immediately reported.

1 May

To: National Marine Fisheries Service

Issue: Proposed rule to amend the bottlenose dolphin take reduction plan by making permanent the ban on nighttime fishing off North Carolina with gillnets of medium mesh

Recommendation: The Commission recommended that the National Marine Fisheries Service adopt its proposed rule to make permanent the existing seasonal ban (1 November to 30 April) on nighttime fishing off North Carolina with gillnets having a mesh size of 5 to 7 inches.

Agency Response: The Service issued the final rule on 30 August 2012, consistent with the Commission's recommendation.

7 May

To: Bureau of Ocean Energy Management

Issue: Proposed Cook Inlet special interest lease sale 244

Recommendation: The Commission recommended that the Bureau of Ocean Energy Management defer the proposed lease sale until such time that the Bureau can, with reasonable confidence, confirm that the proposed activities are not likely to jeopardize the survival or recovery of the Cook Inlet beluga whale population—if, despite the uncertain risk to the population, the Bureau decides to conduct the lease sale, then the Commission recommended that the Bureau restrict the lease sale to the southernmost portions of the Cook Inlet planning area.

Agency Response: The Bureau deferred the proposed lease sale until 2016 to allow for the preparation of an environmental impact statement, which is somewhat consistent with the Commission's recommendation.

7 May

To: National Marine Fisheries Service

Issue: Status review of the ringed seal under the Endangered Species Act

Recommendation: The Commission recommended that the National Marine Fisheries Service proceed with the proposed listing of the Arctic and Okhotsk ringed seal subspecies as threatened under the Endangered Species Act and re-evaluate the status and threats (i.e., both individual and cumulative) to the Baltic and Ladoga ringed seal subspecies and consider listing them as endangered.

Agency Response: The Service issued a final listing determination on 28 December 2012, consistent with the Commission's recommendations. However, after re-evaluating the Baltic and Ladoga ringed seal subspecies, it determined that only the Ladoga ringed seal subspecies should be listed as endangered. The Service determined that the Baltic subspecies of the ringed seal is not in danger of extinction throughout all its range, but is likely to become so within the foreseeable future; therefore, the Service listed it as threatened. The final rule will be effective 26 February 2013.

7 May

To: National Marine Fisheries Service

Issue: Status review of the bearded seal under the Endangered Species Act

Recommendation: The Commission recommended that the National Marine Fisheries Service proceed with the proposed listing of the Sea of Okhotsk and Beringia distinct population segments of the bearded seal as threatened under the Endangered Species Act.

Agency Response: The Service issued a final listing determination on 28 December 2012, consistent with the Commission's recommendation. The final rule will be effective 26 February 2013.

10 May

To: U.S. Fish and Wildlife Service

Issue: Application for a research permit from Edmund Gerstein, Ph.D., to take Florida manatees by deliberate harassment to test the effectiveness of an acoustic device for alerting them of approaching vehicles during a two-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, subject to the previous permit conditions.

Agency Response: The Service issued the permit on 28 June 2012, consistent with the Commission's recommendation.

10 May

To: U.S. Fish and Wildlife Service

Issue: Application to amend a research permit from the Alaska Department of Fish and Game to add procedures when conducting research on walruses in Alaska

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit amendment, provided that the conditions contained in the current permit remain in effect

Agency Response: The Service issued the permit on 22 June 2012, consistent with the Commission's recommendation.

10 May

To: U.S. Fish and Wildlife Service

Issue: Application from Milton Levin, Ph.D., to obtain, import, export, and conduct analyses on manatee and polar bear samples during a five-year period

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 June 2012, consistent with the Commission's recommendation.

10 May

To: National Marine Fisheries Service

Issue: Application amendment for a research permit from the Pacific Whale Foundation to change its principal investigator in its application to study humpback whales in Hawaii during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, subject to the Commission's 12 December 2011 recommendation that the Service condition the permit to require the Pacific Whale Foundation to minimize disturbance of the subject animals by using 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 issued the permit on 18 September 2012, consistent with the Commission's recommendation.

14 May

To: National Marine Fisheries Service

Issue: Application from the Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to three marine geophysical surveys to be conducted in the northeast 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 explaining the rationale for (1) basing the exclusion and buffer zones for the proposed survey in the northeast 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) using simple ratios to adjust for tow depth and applying median values to estimate propagation in intermediate water depths rather than using empirical measurements. The Commission also recommended that the Service (1) require the Observatory to re-estimate the number of takes during the first survey (i.e., Juan de Fuca plate survey) by accounting for two passes over the three long transect lines, which should effectively double the estimated number of takes from a single survey pass of those lines; (2) prohibit an 8-minute pause following the sighting of a marine mammal in the exclusion zone and extend that pause to cover the maximum dive times of the species likely to be encountered prior to resuming airgun operations after both power-down and shut-down procedures; and (3) 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; require the Observatory 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.

Agency Response: The Service issued three separate incidental harassment authorizations on 13 June, 1 July, and 12 July 2012, consistent with some of the Commission's recommendations. 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. The Service also did not recalculate the number of takes based on either two passes of three survey lines during the Juan de Fuca plate survey or maximum densities. It stated that if multiple exposures occur to an individual within a 24-hour period, those individuals would be considered to be taken only once; however, in this instance those animals would be taken twice on different days (i.e., not within a 24-hour period). The Service further stated that the Observatory's estimated number of takes assumed that the animals are stationary, so two passes over the three long transect lines is affecting the same number of individuals twice, but neither the Service nor the Observatory estimated the takes based on those individuals being taken twice (i.e., increasing the number of takes to account for those taken twice) nor did it stipulate that a certain number of animals (i.e., those within the Level B harassment zone for the three survey lines) would be taken twice. In addition, the Service 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 also did not extend the monitoring period to the maximum dive time observers are monitoring for 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 planned to work with the National Science Foundation and the Observatory to help identify the effectiveness of the mitigation measure for seismic surveys, but noted that data being compiled from geophysical surveys are scant and it is unlikely that the information will result in any statistically robust conclusions for this particular seismic survey. In the long term, information regarding effectiveness may be provided.

14 May

To: National Marine Fisheries Service

Issue: Application from John Calambokidis to conduct research on various cetacean and pinniped species in U.S., foreign, and international waters of the eastern Pacific Ocean during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to require Mr. Calambokidis to make observations sufficient to detect possible short- and long-term effects of tagging and report the effort made and the information collected to the Service and ensure that tagging activities to be conducted under this permit and those of other permit holders who might be tagging the same species in the same areas are coordinated and data and samples are shared to avoid duplicative research and unnecessary disturbance of animals. The Commission also recommended that

the Service advise Mr. Calambokidis of the need to obtain permits under CITES prior to importing or exporting parts from marine mammals listed in the Convention's appendices, which includes bringing samples collected in foreign or international waters into the United States.

Agency Response: The Service issued the permit on 12 July 2012, consistent with the Commission's recommendations.

15 May

To: National Marine Fisheries Service

Issue: Application from the Federal Transit Authority and Federal Highway Administration, on behalf of the Columbia River Crossing project, to take small numbers of pinnipeds incidental to construction and demolition activities in the Columbia River and North Portland Harbor in Washington and Oregon

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the final rule but require that the time frame for implementing ramp-up procedures be adjusted if pinnipeds are in the construction area, regardless of time of year and require the applicant to implement ramp-up procedures (1) after 15 minutes, if pile driving was delayed or shut down due to the presence of a pinniped within or approaching the shut-down zone or (2) after 30 minutes, if pile driving has ceased for other reasons (i.e., equipment problems, work schedules, logistics) and no pinniped has been observed within or approaching the shut-down zone. The Commission also recommended that the Service require the applicant to use an additional small number of shore- or watercraft-based observers to determine how far up- or down-river bridge construction and demolition have an effect on pinniped behavior; specify that the proposed number of pinniped takes may occur by in-water and in-air harassment when the animals are near the sound source; and require the applicant to conduct in-situ sound measurements if and when vibratory hammers are used concurrently, adjusting the extent of the Level B harassment zone as necessary.

Agency Response: The Service had not issued the final rule by the end of 2012.

21 May

To: National Marine Fisheries Service

Issue: Application for a research permit from Eye of the Whale to conduct research on humpback whales in Alaska waters during a five-year period

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 2012.

25 May

To: Bureau of Ocean Energy Management

Issue: Draft environmental assessment on lease issuance for marine hydrokinetic testing technology on the Outer Continental Shelf offshore of Florida

Recommendation: The Commission recommended that the Bureau of Ocean Energy Management revise the proposed lease and amend the associated environmental assessment as necessary to require the Florida Atlantic University's Southeast National Marine Renewable Energy Center to notify the National Marine Fisheries Service immediately if any injured or dead marine mammal is encountered, and to provide the Bureau with annual reports

and a final report summarizing all marine mammal sightings and actions taken in response to those sightings; cease all activities involving an acoustic source, moving or operating turbines, or other mechanical equipment when any portion of the exclusion zone is obscured by poor visibility; and deploy an underwater video camera (or system of cameras) to assess the nature and outcome of underwater interactions with marine mammals and other marine species.

Agency Response: The Bureau had issued the final environmental assessment or the lease by the end of 2012.

29 May **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from James Hain, Ph.D., to increase the number of North Atlantic right whale takes during aerial and vessel surveys off the U.S. southeast coast during a five-year period

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.

Agency Response: The Service had not issued the permit amendment by the end of 2012.

29 May **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from the Alaska SeaLife Center to conduct research on Weddell seals in Antarctica

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 and it advises the Center of the need to have its IACUC review and approve the revised research protocols prior to implementing them in the field.

Agency Response: The Service issued the permit amendment on 3 August 2012, consistent with the Commission's recommendations.

31 May **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from the Alaska Department of Fish and Game to conduct research on 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 and that the permit is further conditioned to include requirements to monitor darted animals and report (1) their behavioral response and any activities that place them at heightened risk of injury or death; (2) whether they entered the water and their fate could not be determined; and (3) the number of darted animals with dependent pups and the response/behavior of the pups. The Commission also recommended that the Service require the Department to halt the use of the remote immobilization technique and consult with the Service and the Commission if three or more animals are darted and suffer life-threatening 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 12 June 2012, consistent with the Commission's recommendations.

1 June

To: National Marine Fisheries Service

Issue: Application from BP Exploration (Alaska), Inc. , to take small numbers of marine mammals by harassment incidental to a seismic survey in the Simpson Lagoon area of the Alaskan Beaufort Sea during the open-water season

Recommendation: The Commission recommended that the National Marine Fisheries Service continue to include proposed incidental harassment authorization language at the end of *Federal Register* notices but ensure that the language is consistent with that referenced in the main body of the *Federal Register* notice. The Commission also recommended that the Service use species-specific maximum density estimates or average estimates adjusted by a precautionary correction factor as a basis for (1) estimating the expected number of takes and (2) making its determination regarding whether the total taking would have a negligible impact on the species or stocks. In addition, 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 disturbance zones; restrict the commencement of ramp-up from a full shutdown at night or in periods of poor visibility, regardless of whether the entire 180-dB re 1 µPa exclusion zone is visible; specify reduced vessel speeds of 9 knots or less when whales are within 300 m or when weather conditions reduce visibility; and require BP to report injured and dead marine mammals to the Service and local stranding network using the Service's phased approach to reporting, as outlined in the proposed incidental harassment authorization language at the end of the *Federal Register* notice.

Agency Response: The Service issued an incidental harassment authorization on 1 July 2012, consistent with some of the Commission's recommendations. The Service used average density estimates to calculate the estimated numbers of takes, because those estimates were based on surveys and monitoring of marine mammals in the vicinity of the proposed project area. The Service also believed that using beluga data from Moore et al. (2000) was the most representative for the area, time, and water depths of the proposed survey. For species whose average densities were too low to yield a take number, due to their extralimital distribution in the vicinity of the proposed survey area, the Service authorized a few takes. In addition, the Service stated that the proposed visual monitoring measures were standard methods used by industry and research institutes to reduce potential impacts to marine mammals and although there is no guarantee that all marine mammals within or entering the exclusion zones would be detected immediately, it is confident that monitoring combined with other mitigation measures (including ramp up and restricting cold starts in poor visibility conditions) would make injury or temporary threshold shifts unlikely. The Service agreed that ramping up from a full shutdown should not occur at night or in periods of poor visibility; however, the Service would allow ramp up from a full shutdown if the entire 180-dB re 1 µPa zone is visible without using night-vision devices.

11 June **To:** National Marine Fisheries Service

Issue: Application for a research permit from Mark Baumgartner, Ph.D., to conduct research on eight mysticete species in the northwest Atlantic, northeast Pacific, and Arctic Oceans during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) condition the permit to require that Dr. Baumgartner make observations regarding possible short- and long-term effects of tagging on all age and sex classes, but particularly on female-calf pairs, and report the effort made and the information collected to the Service; (2) ensure that tagging activities to be conducted under this permit and those of other permit holders who might be tagging the same species in the same areas are coordinated and ensure that samples are shared to avoid duplicative research and unnecessary disturbance of animals; (3) allow the requested number of incidental harassment takes as long as the other approach restrictions are clearly stipulated in the permit; and (4) advise Dr. Baumgartner of the need to have IACUC review and approve all research protocols prior to implementing them in the field.

Agency Response: The Service had not issued the permit by the end of 2012.

11 June **To:** National Marine Fisheries Service

Issue: Application for a research permit from Shannon Atkinson, Ph.D., to receive, import, and export samples from unidentified cetaceans and pinnipeds during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service require Dr. Atkinson to (1) provide documentation sufficient to demonstrate that each sample to be imported 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 and (2) maintain detailed records indicating the source of each specimen, the circumstances under which it was collected, and the researchers and associated institutions that receive the samples. The Commission also recommended that the Service advise Dr. Atkinson of the need to obtain all necessary permits under CITES before importing or exporting any marine mammal sample.

Agency Response: The Service issued the permit on 31 July 2012, consistent with the Commission's recommendations.

11 June **To:** National Marine Fisheries Service

Issue: Application for a research permit from Robert Garrott, Ph.D., to conduct research on Weddell seals in Antarctica 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 3 August 2012, consistent with the Commission's recommendation.

18 June **To:** National Maine Fisheries

Issue: Application from Stephen Trumble, Ph.D., to obtain and conduct analyses on mysticete earplugs during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but only if it (1) requires Dr. Trumble to provide documentation sufficient to demonstrate that each sample to be imported 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, (2) specifies that samples taken in any country's whaling operations that prompted the Secretary of Commerce to certify the country under the Pelly Amendment may not be imported, and (3) specifically limits importation of minke whale samples from Japan to those from whales taken before the 1986 moratorium on commercial whaling.

Agency Response: The Service issued the permit on 18 July 2012, consistent with the Commission's recommendations. However, the Service did specify that the Pelly Amendment does not prohibit the importation of whale parts taken during whaling activities of Japan, Norway, and Iceland, as a result of certification of these nations under the Amendment. However, it recognized that the U.S. opposes commercial whaling and lethal scientific whaling. Therefore, the Service did not authorize the importation of marine mammal parts from these sources at the present time. However, it noted that its decision regarding the permit does not preclude consideration of future requests for importation of marine mammal parts from those sources and that it would seek approval from the Assistant Administrator on a case by case basis.

18 June

To: National Marine Fisheries Service

Issue: Proposed rule to implement amendments 86 and 76 of the fishery management plan for the groundfish of the Bering Sea and Aleutian Islands management area and the fishery management plan for the groundfish of the Gulf of Alaska, respectively

Recommendation: The Commission recommended that the National Marine Fisheries Service adopt the proposed rule to implement amendments 86 and 76; work with the North Pacific Fishery Management Council to further modify the observer program so that the Service controls the deployment of observers in both the partial and full coverage categories; develop and implement a method to estimate reliably the bias in estimates of protected species bycatch that would result from not observing the exempted vessels and gear types (i.e., those using jig gear or those less than 40 ft using pot or hook-and-line gear); and develop an implementation plan for electronic monitoring on groundfish vessels, including a means for (1) assessing both those protected species that are brought on board and those that are not, and (2) analyzing the effectiveness of the electronic monitoring at identifying the species, estimating the numbers, and characterizing the severity of injuries to protected species, whether they are or are not brought on board. The Commission also recommended that the Service establish coverage performance standards based on desired strata variances (CVs), rather than potentially inadequate, budget-driven, one-size-fits-all coverage prescriptions, and modify the proposed rule to include precision targets for estimates of protected species bycatch, which are no lower than a CV of 30 percent, or its equivalent.

Agency Response: The Service issued the final rule on 21 November 2012, consistent with a few of the Commission's recommendations. Although the Service acknowledged that other sources of bias and uncertainty in observer data still exist, it believed that it only needed to control deployment of observers in the partial coverage category because all fishing trips are observed in the full coverage category and the Service's best information indicates that active observer providers are in compliance with requirements. The Service also indicated

that electronic monitoring of protected species is challenging, but that further work is needed to assess the ability of cameras to detect and identify protected species interactions with fishing vessels. It plans to consider those interactions as one of the objectives for electronic monitoring measures; however, it did not specify its implementation plan for those measures. In addition, the Service agreed that performance standards are an important and necessary step towards a fully optimized deployment of observers, but that those standards were not part of the proposed rule. It further stated that it is not required to implement a restructured observer program, but that it will be able to use the information from such a program to develop performance standards.

18 June

To: National Marine Fisheries Service

Issue: Application for a research permit from Bruce Mate, Ph.D., to conduct research on 83 cetacean and pinniped species in U.S., foreign, and international waters worldwide 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 Dr. Mate make observations regarding possible short- and long-term effects of tagging on all age and sex classes, but particularly on female-calf pairs, and report the effort made and the information collected to the Service; (2) require that Dr. Mate notify the Service's regional stranding network coordinators of the number and species of animals tagged, location of the tag on the animal, and type of tag used for animals instrumented along their coastline within a given year; (3) prohibit the use of deeply penetrating tags (e.g., the Telonics ST-15 and Wildlife Computers SPOT5 tags, as described in Dr. Mate's application) on killer whales until the true risks of applying those instruments to that species have been better characterized. The Commission also recommended that the Service ensure that tagging activities to be conducted under this permit and those of other permit holders who might be tagging the same species in the same areas are coordinated and data and samples are shared to avoid duplicative research and unnecessary disturbance of animals.

Agency Response: The Service had not issued the permit by the end of 2012.

20 June

To: U.S. Fish and Wildlife Service

Issue: Proposed resolutions, decisions, and agenda items for the Sixteenth Conference of Parties to CITES

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service submit a proposal that the polar bear be placed on Appendix I for consideration at the 2013 Conference of Parties; consider the pros and cons of a population-specific proposal for Appendix I listing of the polar bear; and monitor closely the establishment of new harvest limits in Canada and be prepared to amend its proposal accordingly. The Commission also recommended that the Service propose to list the walrus on CITES Appendix II and not propose to list the narwhal on CITES Appendix I at the 2013 Conference of Parties.

Agency Response: The Service submitted the proposals for the 2013 Conference of Parties, consistent with most of the Commission's recommendations. However, it did not submit a proposal to list the walrus on CITES Appendix II.

25 June

To: National Marine Fisheries Service

Issue: Application from the Navy to take small numbers of marine mammals by harassment incidental to pile removal during repair of the Explosive Handling Wharf-1 at Kitsap Naval Base in Bangor, Washington

Recommendation: The Commission recommended that the National Marine Fisheries Service require the Navy to measure in-air sound levels as a function of distance from the pneumatic chipper and make concurrent observations of marine mammal behavioral responses to in-air sound produced by those activities and re-estimate the number of in-water and in-air takes using the overall density of harbor seals in Hood Canal (i.e., 3.74 animals/km2)—if new data (marine mammal surveys at Naval Base Kitsap in 2008 and 2009-10 or monitoring reports from pile driving activities at Naval Base Kitsap in 2011) indicate that the density estimate of 3.74 seals/km2 is too high, then refine the density estimate based on those data rather than using the Navy's biased estimate. The Commission also recommended that the Service require the Navy to implement soft-start procedures after 15 minutes if pile removal was delayed or shut down because of the presence of a marine mammal within or approaching the shut-down zone and develop a monitoring strategy that ensures it will be able to detect and characterize marine mammal responses to the pile-removal activities as a function of sound levels and distance from the pile-removal sites. In addition, the Commission recommended that the Service (1) 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 Explosive Handling Wharf-2 construction project) impacting marine mammals in the Hood Canal area prior to issuing the incidental harassment authorization; (2) encourage the Navy to combine future requests for incidental harassment authorizations for all activities that would occur in the same general area and within the same year rather than segmenting those activities and their associated impacts by requesting separate authorizations; and (3) adopt a policy to provide an additional opportunity for public review and comment before amending authorizations if any substantive changes are made to them after they have been issued or if the information on which a negligible impact determination is based is significantly changed in a way that indicates the likelihood of an increased level of taking or impacts not originally considered.

Agency Response: The Service issued the incidental harassment authorization on 16 July 2012, consistent with a few of the Commission's recommendations. The Service believed that the harbor seal density estimate used for estimating the number of takes was sufficiently conservative. It acknowledged that it is possible that greater than 35 percent of seals could enter the water during the course of pile removal activity, but that it is impossible, given available data, to determine exactly what number of individuals above 35 percent may potentially be exposed to underwater sound. The Service did note that the marine mammal surveys at Naval Base Kitsap in 2008 and 2009-10 or monitoring reports from pile driving activities at Naval Base Kitsap in 2011support the conservatism of the 1.31 seals/km2 density estimate but did not amend the estimate based on those data. The Service also did not require the Navy to implement soft-starts after a 15-minute clearance time because it determined that it would be (1) extremely unlikely that an animal could remain undetected in such a small shut-down zone and under typical conditions in Hood Canal and (2) impracticable, resulting in significant construction delays and therefore extending the overall time required for the project and thus the number of days on which disturbance of marine mammals could occur. In addition, the Service believed that the Navy's monitoring strategy would fulfill the intent recommended by the Commission, but did note that the Navy would not have

vessel-based monitoring in the far-field but could rely on monitoring from the concurrent explosive handling wharf-2 construction project (which includes additional activities (i.e., impact and vibratory pile driving) that may overlap with the proposed pile removal project. Although the Commission indicated that some of the shortcomings involved not having far-field monitoring of the entire Level B harassment zone specific to the proposed project, the Service was unclear what aspects of the monitoring goals or strategy the Commission considered inadequate. Regarding cumulative impacts, the Service indicated that the impacts from other past and ongoing anthropogenic activities were incorporated into the negligible impact analysis via their impacts on the environmental baseline (e.g., as reflected in the density/ distribution and status of the species, population size and growth rate, and ambient sound) and that cumulative impacts were addressed in the Navy's environmental assessment and in the biological opinion prepared for this action. Finally, the Service stated that it would consider allowing for an additional public comment period in the future for situations where substantive changes are required, but believed that the referenced incidental harassment authorization modifications did not constitute a substantive change—those modifications involved small increases to the number of incidental takes of harbor porpoises authorized for two projects conducted in 2011 at Naval Base Kitsap in response to new information regarding harbor porpoise occurrence and habitat use at the base.

25 June

To: National Science Foundation

Issue: Application for a permit from Robert Garrott, Ph.D., to conduct research on Weddell seals at Cape Evans, Backdoor Bay, Hut Point, Cape Royds, Terra Nova Bay, and northwest White Island, Antarctica

Recommendation: The Commission recommended that the National Science Foundation defer issuance of the requested permit under the Antarctic Conservation Act until the National Marine Fisheries Service has issued its permit under the Marine Mammal Protection Act.

Agency Response: The Foundation issued the permit on 14 August 2012, consistent with the Commission's recommendation.

25 June

To: National Marine Fisheries Service

Issue: Proposed rule on confidentiality of information collected under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act

Recommendation: The Commission recommended that the National Marine Fisheries Service adopt the proposed rule governing confidentiality of information collected under the Magnuson-Stevens Fishery Conservation and Management Act but exclude from the definition of "business of any person" information that is collected by observers as part of their official duties and that is necessary to (1) protect and conserve species in accordance with the requirements of the Marine Mammal Protection Act and Endangered Species Act; (2) protect and conserve species in accordance with other federal and state statutes passed to promote conservation of protected species; and (3) describe or understand how protected species are caught incidentally or how to avoid such takes.

Agency Response: The Service had not issued the final rule by 2012.

26 June **To:** National Marine Fisheries Service

Issue: Application from the America's Cup Event Authority and the Port of San Francisco to take small numbers of marine mammals by harassment incidental to construction activities, helicopter overflights, and firework displays in support of the 34th America's Cup in San Francisco, California

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization but require the Authority and Port to assess and use the average ambient sound level minus two standard deviations down to the 120-dB re 1 μPa threshold as a basis for establishing the Level B harassment zone and implement ramp-up procedures after 15 minutes if pile driving was delayed or shut down because of the presence of a marine mammal within or approaching the shut-down zone and observers did not see that marine mammal leave the zone. The Commission also recommended that the Service require the Authority and Port to monitor (1) before, during, and after all ramp-ups of vibratory and impact pile-driving to gather the data needed to determine the effectiveness of this technique as a mitigation measure and (2) the Level A and B harassment zones to detect the presence and characterize the behavior of marine mammals during all vibratory and impact pile-driving activities.

Agency Response: The Service issued the incidental harassment authorization on 9 August 2012, consistent with one of the Commission's recommendations. However, it stated that the requirement to implement soft-starts following a 15-minute shutdown would implicitly reject the premise that small cetaceans and pinnipeds are typically unlikely to remain within variably-sized, but usually small, shut-down zones for longer than 15 minutes (i.e., there is no reason to make such a requirement if, as it believes, the 15- minute shut-down period is sufficient for small cetaceans and pinnipeds to clear a defined shut-down zone. Further, the Service indicated that (1) the possibility of a marine mammal remaining undetected in the shut-down zone, in relatively shallow water, for greater than 15 minutes is discountable and (2) a requirement to implement a soft-start after every shutdown or delay less than 30 minutes in duration would be impracticable, potentially resulting in significant construction delays and therefore extending the overall time required for the project, and thus the number of days on which disturbance of marine mammals could occur. Finally, the Service stated that monitoring effort is allocated such that days when extreme reactions might be more likely (i.e., when activity begins at a new site) as well as days that are representative of typical levels of activity are accounted for. Marine mammal reactions to continuous sound, such as is produced by vibratory pile driving, have not typically been observed to be extreme or unexpected. It clarified that the purpose of this monitoring is to verify the number and intensity of behavioral reactions that might be considered incidental takes and indicated that the monitoring plan is sufficient to accomplish that task. Further, while dedicated observers are not present during the non-monitored days, construction personnel and project staff will be at the site and will report extreme behavioral reactions to the Service.

26 June **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from Geo-Marine, Inc., to increase the number of sei whale takes each year to gain more information on their distribution and habitat use

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.

Agency Response: The Service issued the permit amendment on 9 July 2012, consistent with the Commission's recommendation.

27 June

To: National Marine Fisheries Service

Issue: Application from the Navy to take small numbers of marine mammals by harassment incidental to pile driving and removal in association with construction of the explosive handling wharf-2 at Naval Base Kitsap in Bangor, Washington

Recommendation: The Commission recommended that the National Marine Fisheries Service require the Navy to measure in-air sound levels as a function of distance from the vibratory and impact hammers and make concurrent observations of marine mammal behavioral responses to in-air sound produced by pile-driving and -removal activities and re-estimate the number of in-water and in-air takes using the overall density of harbor seals in Hood Canal (i.e., 3.74 animals/km2)—if new data (marine mammal surveys at Naval Base Kitsap in 2008 and 2009-10 or monitoring reports from pile driving activities at Naval Base Kitsap in 2011) indicate that the density estimate of 3.74 seals/km2 is incorrect, then refine the density estimate based on those data rather than using the Navy's biased estimate. The Commission also recommended that the Service require the Navy to measure in-situ sound levels for 30 days after the initiation of major pile-driving scenarios and then provide the analytical results (i.e., sound levels as a function of distance) to the Service within an additional 15 days—if the Navy is unable to meet the 15-day analysis deadline, then require the Navy to use maximum distances to the Level A harassment thresholds of 190 dB re 1 μPa (i.e., 20 m for 36- and 48-in piles) and 180 dB re 1 μPa (i.e., 200 m for 36-in and 120 m for 48-in piles) from the test pile program until the in-situ sound measurement data have been analyzed and the distances to thresholds verified for wharf construction. In addition, the Commission recommended that the Service require the Navy to (1) conduct in-situ sound measurements if and when vibratory hammers are used concurrently and to use that information to ensure that it (a) expands appropriately the size of the Level B harassment zone for in-water sounds, (b) monitors the entire expanded zone, and (c) estimates the resulting number of takes accurately; (2) implement soft-start procedures after 15 minutes if pile driving or removal was delayed or shut down because of the presence of a marine mammal within or approaching the shut-down zone; and (3) develop a monitoring strategy that ensures it will be able to detect and characterize marine mammal responses to the pile-driving and -removal activities as a function of sound levels and distance from the pile-driving and -removal sites. Lastly, the Commission recommended that the Service (1) complete an analysis of the impact of the proposed activities together with the cumulative impacts of all the other pertinent risk factors (including but not limited to the Navy's concurrent Explosive Handling Wharf-1 repair project) impacting marine mammals in the Hood Canal area prior to issuing the proposed incidental harassment authorization; (2) encourage the Navy to combine future requests for incidental harassment authorizations for all activities that would occur in the same general area and within the same year rather than segmenting those activities and their associated impacts by requesting separate authorizations; and (3) adopt a policy to provide an additional opportunity for public review and comment before amending authorizations if any substantive changes are made to them after they have been issued or if the information on which a negligible impact determination is based is significantly changed in a way that indicates the likelihood of an increased level of taking or impacts not originally considered.

Agency Response: The Service issued the incidental harassment authorization on 16 July 2012, consistent with a few of the Commission's recommendations. The Service believed that the harbor seal density estimate used for estimating the number of takes was sufficiently conservative. It acknowledged that it is possible that greater than 35 percent of seals could enter the water during the course of pile removal activity, but that it is impossible, given available data, to determine exactly what number of individuals above 35 percent may potentially be exposed to underwater sound. The Service did note that the marine mammal surveys at Naval Base Kitsap in 2008 and 2009-10 or monitoring reports from pile driving activities at Naval Base Kitsap in 2011support the conservatism of the 1.31 seals/km2 density estimate but did not amend the estimate based on those data. The Service also determined that a requirement to adjust zones within 15 days of the completion of a 30-day acoustic monitoring period is impracticable in this situation. Given that the Navy is unable to meet the 15- day analysis deadline recommended by the Commission, the Service partially accepted the Commission's alternative recommendation to use maximum distances to Level A harassment thresholds from empirical measurements completed in 2011. The Service required the Navy to implement a 20-m shut-down zone around all pile driving for pinnipeds, but required only an 85-m shut-down zone for cetaceans (rather than 200 m because the Service believed monitoring the larger zone would detract from the Navy's ability to effectively mitigate the possibility of pinniped injury while conferring no additional benefit on cetaceans). The Navy would be required to complete analysis of acoustic monitoring data and adjust zones as necessary no later than 90 days following the completion of the acoustic monitoring period. The Service would require the Navy to conduct in-situ measurements when multiple hammers are used concurrently but stated that it was not practicable for the Navy to monitor the entire Level B harassment zone nor was it possible for the predicted zone to expand, as it is defined not by the predicted sound pressure levels but by the contours of the Hood Canal shoreline. The Service also did not require the Navy to implement soft-starts after a 15-minute clearance time because it determined that it would be (1) extremely unlikely that an animal could remain undetected in such a small shut-down zone and under typical conditions in Hood Canal and (2) impracticable, resulting in significant construction delays and therefore extending the overall time required for the project and thus the number of days on which disturbance of marine mammals could occur. In addition, the Service believed that the Navy's monitoring strategy would fulfill the intent recommended by the Commission. Although the Commission indicated that some of the shortcomings involved not having far-field monitoring of the entire Level B harassment zone specific to the proposed project, the Service was unclear what aspects of the monitoring goals or strategy the Commission considered inadequate. Regarding cumulative impacts, the Service indicated that the impacts from other past and ongoing anthropogenic activities were incorporated into the negligible impact analysis via their impacts on the environmental baseline (e.g., as reflected in the density/ distribution and status of the species, population size and growth rate, and ambient sound) and that cumulative impacts were addressed in the Navy's environmental assessment and in the biological opinion prepared for this action. Finally, the Service stated that it would consider allowing for an additional public comment period in the future for situations where substantive changes are required, but believed that the referenced incidental harassment authorization modifications did not constitute a substantive change—those modifications involved small increases to the number of incidental takes of harbor porpoise authorized for two projects conducted in 2011 at Naval Base Kitsap in response to new information regarding harbor porpoise occurrence and habitat use at the base.

2 July

To: Bureau of Ocean Energy Management

Issue: Draft programmatic environmental impact statement on geological and geophysical exploration of the Atlantic Outer Continental Shelf

Recommendation: The Commission recommended that the Bureau of Ocean Energy Management select alternative B as its preferred alternative and amend alternative B to (1) expand the geographic boundary of the time-area restriction on airgun seismic surveys to all coastal waters out to 55 km from shore and (2) require passive acoustic monitoring to detect nearby vocalizing marine mammals for all active acoustic surveys that have the potential to take marine mammals by harassment, including high resolution geophysical surveys. The Commission also recommended that the Bureau add an analysis of the direct and indirect economic costs of implementing each alternative, describe the criteria the Bureau will use to select a preferred alternative, and add an additional comment period so that the public is able to review and judge that material and comment on it; increase its efforts to maximize the utility of seismic data while minimizing the number and impacts of new seismic studies, using suggested strategies described below; include in its final environmental impact statement an alternative that, as part of the permitting process, would promote the further development, testing, and use of alternative, less harmful technologies to collect the required geophysical information; and work with other agencies with related responsibilities, the oil and gas industry, scientists, conservation organizations, and other stakeholders to develop standards for baseline data collection and ensure the availability of adequate baseline information before moving forward with the proposed geological and geophysical surveys. In addition, the Commission recommended that the Bureau (1) provide confidence limits and sources of potential bias associated with the density and take estimates that were calculated for each species; (2) use the 120-dB re 1 μPa threshold to recalculate the Level B harassment zone and associate takes for the use of shallow-penetration sub-bottom profilers and other non-impulsive sound sources; and (3) include in its calculation of estimated takes an assessment of all potential sound sources associated with geological and geophysical surveys, including exploratory drilling and vessel sounds. Further, the Commission recommended that the Bureau require, as a term and condition for issuing a geological and geophysical permit, that applicants obtain authorization under section 101(a)(5)(A) or (D) of the Marine Mammal Protection Act to take small numbers of marine mammals incidental to those activities and use the mitigation measures proposed for seismic airgun surveys (i.e., the seismic airgun survey protocol) as minimal mitigation measures for all high-resolution geophysical surveys and other sounds that have the potential to take marine mammals by Level A or Level B harassment. Lastly, the Commission recommended that the Service (1) develop comprehensive, standardized monitoring protocols for assessing the effects of geological and geophysical surveys and associated activities on marine mammals; (2) prepare annual summaries of marine mammal observer reports, including an analysis of the frequency and outcome of all marine mammal-vessel interactions; (3) require that all operators report immediately to the National Marine Fisheries Service and the local marine mammal stranding network all injured and dead marine mammals in the vicinity of the proposed surveys, and suspend those activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities; and (4) revise its cumulative effects analysis to provide a more rigorous and comprehensive assessment of the full impacts of sound and other human-caused and natural activities that affect marine resources in the proposed action area.

Agency Response: The Bureau had not issued the final environmental impact statement by the end of 2012.

2 July

To: National Marine Fisheries Service

Issue: Proposed rule to delist the eastern stock of Steller sea lions under the Endangered Species Act

Recommendation: The Commission recommended that the National Marine Fisheries Service delist the eastern stock of Steller sea lions as a whole, but recognize that Steller sea lions in the California Current ecosystem comprise a distinct population segment that has not yet met the delisting criteria throughout a significant portion of its range and retain a threatened status for that distinct population segment until such time that either it meets fully the criteria for delisting or the Service can insure that the slow growth and range retraction in California waters are not caused by the direct or indirect effects of human activities.

Agency Response: The Service had not issued the final listing rule by the end of 2012.

3 July

To: National Science Foundation

Issue: Application to modify a permit from the Alaska SeaLife Center to conduct research on Weddell seals in McMurdo Sound, Antarctica

Recommendation: The Commission recommended that the National Science Foundation approve the requested permit modification under the Antarctic Conservation Act but defer issuing it until the National Marine Fisheries Service has issued its permit amendment under the Marine Mammal Protection Act

Agency Response: The Foundation issued the permit on 24 August 2012, consistent with the Commission's recommendation.

3 July

To: National Marine Fisheries Service

Issue: Application for a research permit from North Slope Borough to receive, import, and export samples from nine marine mammal species 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 9 August 2012, consistent with the Commission's recommendation

5 July

To: National Marine Fisheries Service

Issue: Application from the Navy to renew and modify a letter of authorization to conduct training operations in the Mariana Islands Range Complex

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the letter of authorization but require the Navy to (1) model the proposed monitoring schemes to determine what portion of the associated buffer zone is being monitored at any given time and the probability that any of the cetacean species in the area and entering the various-sized buffer zones would be detected before it gets too close to the detonation site; (2) (a) measure empirically the propagation characteristics of the blast (i.e., impulse, peak

pressure, and sound exposure level) from the 5- and 10-lb charges used in the proposed exercises and (b) use that information to establish appropriately sized exclusion and buffer zones; and (3) 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 and for which taking authorization has been granted.

Agency Response: The Service issued the letter of authorization on 10 August 2012, consistent with none of the Commission's recommendations. The Service stated that the Center for Naval Analysis examined the mitigation measures and determined that the probability of marine mammal detection based on the various schemes would be greater than 95 percent; however, it did not indicate if it incorporated the portion of the zone that is monitored at any given time within those calculations. The Navy also may include collection of in-situ measurements in its monitoring program for its east coast range complexes (as the proposed mine neutralization training activities currently are not conducted at the Mariana Islands Range Complex), if such data can be collected without unreasonable costs and impacts to training. However, the Service indicated that expansion of the buffer zones for activities that involve time-delay firing devices was not warranted because (1) the current buffer zones already incorporate an additional precautionary factor to account for swim speeds above 3 knots and (2) buffer zones greater than 1,000 yards for events using 2 boats and 1,400 yards for events using 3 boats or 2 boats and 1 helicopter cannot be monitored or supported by the Navy's training units.

9 July **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from The Whale Museum to increase the number of southern resident killer whale takes in the inland waters of Washington due to an error in its original take calculation

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.

Agency Response: The Service issued the permit amendment on 3 August 2012, consistent with the Commission's recommendation.

9 July **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from the Northwest Fisheries Science Center to increase takes of both short- and long-beaked common dolphins due to an error in its original application

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.

Agency Response: The Service issued the permit amendment on 18 September 2012, consistent with the Commission's recommendation.

10 July **To:** Naval Facilities Engineering Command, Atlantic

Issue: Navy's Draft environmental impact statement/overseas environmental impact statement (DEIS) for training and research, development, test, and evaluation activities within the Atlantic Fleet training and testing study area in the western North Atlantic Ocean and Gulf of Mexico

Recommendation: The Commission recommended that the Navy revise the DEIS by expanding the range of alternatives under consideration to include at least one with lower levels of training and testing activities and either (1) append to the DEIS any environmental analyses of Atlantic Undersea Test and Evaluation Center activities or (3) complete such analyses to ensure that activities conducted at the Center have been duly evaluated under Executive Order 12114. The Commission also recommended that the Navy (1) adjust all acoustic and explosive thresholds for low-, mid-, and high-frequency cetaceans by the appropriate amplitude factor (e.g., 16.5 or 19.4 dB) if it intends to use the type II weighting functions as depicted in Figure 6 of Finneran and Jenkins (2012); (2) explain why Kastak et al. (2005) data were used as the basis for explosive thresholds in pinnipeds and specify the extrapolation process and factors used as the basis for associated temporary threshold shift (TTS) thresholds; (3) provide detailed information regarding how it determined marine mammal takes that occur when multiple types (i.e., acoustic, explosive, and non-explosive impulsive) of sound-producing sources of varying frequencies (i.e., low, mid, and high) are used simultaneously; and (4) use its spatially and temporally dynamic simulation models to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedoes, unmanned underwater vehicles and expended munitions, ordnance, and other devices) rather than using simple probability calculations. In addition, the Commission recommended that the Navy (1) provide the predicted average and maximum ranges for all criteria (i.e., behavioral response, TTS, permanent threshold shift (PTS), onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), for all activities (i.e., based on the activity category and representative source bins), and all functional hearing groups of marine mammals; (2) use passive and active acoustics, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound; (3) cease the use of its sound sources (including explosive activities that do not use time-delay firing devices) and not reinitiate them for periods at least as long as the maximum dive times of the species observed or likely to be encountered, after the sighting of one or more marine mammals within or about to enter a mitigation zone; and (4) adjust the size of the mitigation zone for mine neutralization events using the average swim speed of the fastest swimming marine mammal occurring in the area where time-delay firing devices would be used to detonate underwater explosives. Lastly, the Commission recommended that the Navy revise its DEIS by including in its cumulative impacts analysis all potential risk factors, whether they are deemed individually significant or negligible, and describing the specific details needed for the reader to evaluate the utility of the Navy's conceptual framework for its analysis.

Agency Response: The Navy had not issued a final environmental impact statement by the end of 2012.

10 July

To: Naval Facilities Engineering Command, Pacific

Issue: Navy's DEIS for training and research, development, test, and evaluation activities within the Hawaii-Southern California training and testing study area in the central North Pacific Ocean

Recommendation: The Commission recommended that the Navy revise the DEIS by expanding the range of alternatives under consideration to include at least one with lower levels of training and testing activities; revise its discussion of North Pacific right whales by (1) moving it from the section on species unlikely to be found in the study area (i.e., 3.4.1.1) to the section discussing other marine mammals in the study area (i.e. section 3.4.2) and (2) expanding it to provide a more complete review of their status and threats; and undertake research to determine if North Pacific right whales use or regularly migrate through Navy training and testing areas in the Pacific during fall and winter months. The Commission also recommended that the Navy (1) adjust all acoustic and explosive thresholds for low-, mid-, and high-frequency cetaceans by the appropriate amplitude factor (e.g., 16.5 or 19.4 dB) if it intends to use the type II weighting functions as depicted in Figure 6 of Finneran and Jenkins (2012); (2) explain why Kastak et al. (2005) data were used as the basis for explosive thresholds in pinnipeds and specify the extrapolation process and factors used as the basis for associated TTS thresholds; (3) provide detailed information regarding how it determined marine mammal takes that occur when multiple types (i.e., acoustic, explosive, and non-explosive impulsive) of sound-producing sources of varying frequencies (i.e., low, mid, and high) are used simultaneously; and (4) use its spatially and temporally dynamic simulation models to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedoes, unmanned underwater vehicles and expended munitions, ordnance, and other devices) rather than using simple probability calculations. In addition, the Commission recommended that the Navy (1) provide the predicted average and maximum ranges for all criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), for all activities (i.e., based on the activity category and representative source bins), and all functional hearing groups of marine mammals; (2) use passive and active acoustics, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound; (3) cease the use of its sound sources (including explosive activities that do not use time-delay firing devices) and not reinitiate them for periods at least as long as the maximum dive times of the species observed or likely to be encountered, after the sighting of one or more marine mammals within or about to enter a mitigation zone; and (4) adjust the size of the mitigation zone for mine neutralization events using the average swim speed of the fastest swimming marine mammal occurring in the area where time-delay firing devices would be used to detonate underwater explosives. Lastly, the Commission recommended that the Navy revise its DEIS by including in its cumulative impacts analysis all potential risk factors, whether they are deemed individually significant or negligible, and describing the specific details needed for the reader to evaluate the utility of the Navy's conceptual framework for its analysis.

Agency Response: The Navy had not issued a final environmental impact statement by the end of 2012.

10 July

To: National Marine Fisheries Service

Issue: Application from 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 south Vandenberg Air Force Base, California

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the requested authorization, subject to inclusion of the proposed mitigation and monitoring measures.

Agency Response: The Service issued the incidental harassment authorization on 26 September 2012, consistent with the Commission's recommendation.

11 July **To:** National Marine Fisheries Service

Issue: Application for a research permit from Todd Robeck, DVM, Ph.D., to receive, import, and export samples from 14 species of marine mammals during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but require Dr. Robeck to provide documentation sufficient to demonstrate that each sample to be imported 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 and maintain detailed records indicating the source of each specimen, the circumstances under which it was collected, and the researchers and associated institutions that receive the samples

Agency Response: The Service issued the permit amendment on 28 August 2012, consistent with the Commission's recommendations.

11 July **To:** National Marine Fisheries Service

Issue: Application from the U.S. Air Force to take marine mammals incidental to precision strike weapon and air-to-surface gunnery missions within Eglin Air Force Base's Gulf of Mexico Test and Training Range

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) withhold publishing the proposed rule 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 impulse, peak pressure, and sound exposure level thresholds, accounting for the multiple types and quantities of ordnance to be used for representative missions and (2) require the Air Force to (a) model mission scenarios and implement the various thresholds consistently for both precision strike weapon and air-to-surface gunnery missions and (b) determine zones of exposure and associated number of takes for the Level B harassment threshold of 177 dB re 1 µPa2-sec for all precision strike weapon and air-to-surface gunnery missions that involve more than one bomb, missile, or round. The Commission also recommended that the Service require the Air Force to evaluate its mitigation and monitoring measures to assess their effectiveness in detecting marine mammals and minimizing takes and that the Service work with the Air Force to design and conduct the necessary performance verification testing for electronic detection devices under the relevant sea state conditions for air-to-surface gunnery missions before changing any sea state restrictions.

Agency Response: The Service had not issued the proposed rule by the end of 2012.

24 July **To:** National Marine Fisheries Service

Issue: Application to amend a research permit from the Southwest Fisheries Science Center to conduct additional procedures on and surveys of marine mammals in the Pacific, Southern, Arctic, and Indian Oceans

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the current permit conditions remain in effect.

Agency Response: The Service issued the permit on 6 September 2012, consistent with the Commission's recommendation.

24 July **To:** National Marine Fisheries Service

Issue: Application for a research permit from James Lloyd-Smith, Ph.D., to conduct research on California sea lions at Año Nuevo Island, California, for 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 24 September 2012, consistent with the Commission's recommendation.

24 July **To:** U.S. Fish and Wildlife Service

Issue: Application to amend a research permit from Terrie Williams, Ph.D., to conduct additional procedures on sea otters that are being rehabilitated at the Monterey Bay Aquarium

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit amendment, provided that the conditions contained in the current permit remain in effect.

Agency Response: The Service issued the permit on 27 August 2012, consistent with the Commission's recommendation.

26 July **To:** National Marine Fisheries Service

Issue: Application from the Washington State Department of Transportation Ferries Division to take small numbers of marine mammals by harassment incidental to reconstruction of the Port Townsend Ferry Terminal Transfer Span in Puget Sound, Washington

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization but require the Ferries Division to (1) implement ramp-up procedures after 15 minutes if pile-driving or -removal activities were delayed or shut down because of the presence of a marine mammal within or approaching the exclusion zone if observers did not see it leave the zone; (2) monitor before, during, and after all ramp-ups of vibratory and impact pile-driving to gather the data needed to determine the effectiveness of this technique as a mitigation measure; and (3) monitor the Level A and B harassment zones to detect the presence and characterize the behavior of marine mammals during all pile-driving and -removal activities that use a vibratory or impact hammer.

Agency Response: The Service issued the incidental harassment authorization on 12 November 2012, consistent with none of the Commission's recommendations. The Service stated that the possibility of a marine mammal remaining undetected in the small exclusion

zone, in relatively shallow water, for greater than 15 minutes is discountable. Therefore, requiring the Ferries Division to implement ramp-up after every shutdown or delay less than 30 minutes in duration would be impracticable, resulting in significant construction delays and therefore extending the overall time required for the project the number of days during which disturbance of marine mammals could occur. The Service also did not require monitoring of all ramp-ups because it believed that monitoring for all impact pile driving and at least two days per week of vibratory pile driving will allow for adequate data collection and interpretation of how marine mammals are behaving in response to pile driving, including during ramp-ups. In addition, the Service did not require monitoring of the entire extent of the Level A and B harassment zones because it believed that the proposed monitoring during all impact pile driving and during vibratory pile driving for the first two weeks out to 1,900 m would be sufficient to validate take estimates and evaluate the behavioral impacts pile driving has on marine mammals out to full extent of the Level B harassment zone. Further, it believed that the monitoring was adequate because sounds from vibratory pile driving will not exceed the Level A harassment threshold and sounds from impact pile driving only exceed the Level A harassment threshold close to the source (i.e., 22 m).

2 August

To: Bureau of Ocean Energy Management

Issue: Draft environmental assessment on commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf offshore Rhode Island and Massachusetts

Recommendation: The Commission recommended that the Bureau of Ocean Energy Management expand its proposed mitigation and monitoring measures to ensure right whales and other marine mammals are protected throughout the leasing area rather than exclude specific blocks from leasing as proposed in alternative B and prohibit high resolution geophysical surveys and pile driving (1) throughout the leasing area from 1 November to 30 April and (2) driving during times when the National Marine Fisheries Service has implemented a Dynamic Management Area restriction within or adjacent to the leasing area. The Commission also recommended that the Bureau continue to support seasonal broad-scale, multi-year wildlife surveys in all areas of established or proposed energy development and work with the relevant federal and state agencies to deploy an array of fixed passive acoustic recorders across the proposed leasing area and to finalize the biological survey guidelines before the Bureau issues wind energy leases. In addition, the Commission recommended that the Bureau ensure that its biological survey guidelines specify not only the type of information needed prior to and during site assessments, but also a system for compiling, archiving, and accessing such data to provide more realistic species-specific take estimates associated with each proposed sound source, including confidence limits and sources of potential bias associated with each take estimate. The Commission further recommended that the Bureau (1) require, as a term and condition for approval of site assessment activities, that applicants obtain authorization, as appropriate, under section 101(a)(5)(A) or (D) of the Marine Mammal Protection Act to take small numbers of marine mammals incidental to those activities; (2) revise the size of its estimated exclusion zones to ensure they encompass the Level B harassment zones (i.e., out to 160 or 120 dB re 1 μPa, as appropriate), as calculated for each sound source; and (3) require wind energy lessees to estimate the proposed exclusion zones for all sound sources using operation- and site-specific information and the relevant thresholds established by the National Marine Fisheries Service, modify those zones as necessary using in-situ sound measurements, and describe how the lessee would monitor those zones effectively. Finally, the Commission recommended that the Bureau (1) require

additional mitigation and monitoring measures; (2) require lessees to monitor exclusion zones for both listed and non-listed marine mammals; (3) require lessees to cease pile driving if a marine mammal has entered the exclusion zone 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 pinnipeds and small odontocetes and 30 minutes in the case of mysticetes and large odontocetes; (4) 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; and (5) include acoustic monitoring as a standard operating condition for lessees to characterize ambient sound levels before, during, and after proposed activities and to monitor for the presence and movements of cetaceans during site assessment and pile driving activities.

Agency Response: The Bureau had not issued the final environmental assessment by the end of 2012.

3 August

To: U.S. Fish and Wildlife Service

Issue: Proposed rule that would re-instate the special rule for the polar bear

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service include in the special rule provisions that are tailored specifically to the conservation needs of polar bears and the threats that they face, primarily the ongoing and projected continuing loss of sea ice and adopt the "no action alternative" identified in the draft environmental assessment, which would make all of the Act's prohibitions applicable in accordance with 50 C.F.R.

§ 17.31(a)—absent adoption of that alternative, adopt alternative 4, which would omit the geographic limitation on the applicability of the incidental take prohibition.

Agency Response: The Service had not issued the special rule by the end of 2012.

3 August

To: U.S. Fish and Wildlife Service

Issue: Revised stock assessment report for the southern sea otter

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service adopt the draft stock assessment report for southern sea otters as written but (1) calibrate any future survey methods against the current survey method to ensure scientists have a basis for comparing results irrespective of method and maintaining an accurate record of population trend and (2) consult with the National Marine Fisheries Service and California Department of Fish and Game to restrict trap openings (not to exceed 5-in in diameter for ring openings and 3- x 9-in for rectangular openings) to prevent the entrapment of sea otters in Dungeness crab, lobster, and finfish traps throughout the range of the southern sea otter—if such measures cannot be adopted expeditiously, pursue the development of an industry-funded observer program that is carefully tailored to monitor the relevant fisheries within the sea otter's range to assess the number of sea otters bycaught and identify alternative take reduction strategies.

Agency Response: The Service had not issued the final stock assessment report by the end of 2012. However, it indicated that it would work with the U.S. Geological Survey regarding survey methods and the National Marine Fisheries Service and California Department of Fish and Game regarding feasibility of implementing trap opening restrictions. The Service

further stated that, accordingly to Hatfield et al. 2011, a very high level of observer coverage and mortalities would be required to detect any trap-related mortality.

6 August **To:** National Marine Fisheries Service

Issue: Application for a research permit from James Shine, Ph.D., to import and receive samples from long-finned pilot whales during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service encourage Dr. Shine to consider obtaining samples from other sources—if appropriate samples are not available from other sources, issue the permit as requested.

Agency Response: The Service issued the permit on 29 August 2012, consistent with the Commission's recommendation. Dr. Shine did indicate that incidental bycatch in commercial fisheries and strandings are rare for this species and he is not aware of another temporal collection, which is needed to model the impacts of global change on the disposition of the changing global mercury pool and the subsequent adverse health effects on marine mammals.

7 August **To:** U.S. Fish and Wildlife Service

Issue: Application for a research permit from Darlene Ketten, Ph.D., to receive, import, and export samples from nine species of marine mammals during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit but require Dr. Ketten to (1) provide documentation sufficient to demonstrate that each sample to be imported 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 and (2) maintain detailed records indicating the source of each specimen and the circumstances under which it was collected.

Agency Response: The Service issued the permit on 13 November 2012, consistent with the Commission's recommendations.

7 August **To:** U.S. Fish and Wildlife Service

Issue: Application for a research permit from the 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, provided that the current permit conditions remain in effect.

Agency Response: The Service issued the permit on 12 December 2012, consistent with the Commission's recommendation.

7 August **To:** U.S. Fish and Wildlife Service

Issue: Application for a research permit from John Wise, Ph.D., to import and export samples from seven marine mammal species during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, but require Dr. Wise to maintain detailed records indicating the source of each sample, the circumstances under which it was collected, the researchers and associated institutions that receive cell lines, and the purpose of their research.

Agency Response: The Service issued the permit on 7 December 2012, consistent with the Commission's recommendation.

9 August **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, Washington

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, subject to conditions that require the Department of Natural Resources to (1) monitor for the presence and characterize the behavior of marine mammals during all proposed in-water activities (i.e., during vibratory pile-removal activities and during vessel and barge use) and (2) monitor 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.

Agency Response: The Service issued the incidental harassment authorization on 1 November 2012, consistent with neither of the Commission's recommendations. The Service disagreed with both of the Commission's recommendations and stated that the Commission did not provide any information that would lead it to offer different responses from those offered in the past. It indicated that those responses could be found in previous *Federal Register* notices and therefore were not repeated.

22 August **To:** National Marine Fisheries Service

Issue: Application from the Honolulu Seawater Air Conditioning, LLC, to take small numbers of marine mammals by harassment incidental to construction of a seawater air conditioning project in the waters off Honolulu, Hawaii

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization but require the company to conduct in-situ sound measurements during impact and vibratory pile driving at representative depths to 1,128 m offshore and re-estimate the total number of takes for spinner and pantropical spotted dolphins based on the total number of pile driving days (i.e., 56 days of impact pile driving and 16 days of vibratory pile driving). The Commission also recommended that the Service require the company to monitor (1) before, during, and after all ramp-ups of vibratory and impact pile-driving to gather the data needed to determine the effectiveness of this technique as a mitigation measure; (2) the Level A and B harassment zones to detect the presence and characterize the behavior of marine mammals during all pile-driving activities that use a vibratory or impact hammer, and (3) for marine mammals not only before and during pile-driving activities, but for 30 minutes after vibratory and impact pile-driving activities have ceased.

Agency Response: The Service issued the incidental harassment authorization on 1 October 2012, consistent with a few of the Commission's recommendations. The Service indicated that the company would conduct in-situ sound measurements at a distance of 10 m from the pile and then at varying distances from the pile in order to evaluate the proposed harassment isopleths, but did not indicate if those measurements would occur out to 1,128 m. The Service did re-estimate the total number of takes for pantropical spotted dolphins but not for spinner dolphins. Although the Service used an appropriate method (which included the

total number of pile driving days) to estimate the number of takes for other small cetaceans, it indicated that it did not re-estimate the takes for spinner dolphins because the authorized number of takes is conservative enough to account for all pile driving days based on the (1) relatively small harassment zone for impact pile driving (1,000 meters), (2) limited amount of pile driving per day (1 hour total over four 15-minute periods), (3) use of average pod size to estimate take (based on visual observations around the entire island of Oahu), and (4) implementation of soft-starts for all impact pile driving. In addition, the Service did not require continuous observations during all pile driving activities because protected species observers would be on-site and monitoring for marine mammals during all impact driving (including during soft-starts) and at least five full days of vibratory pile driving, which would allow for adequate interpretation of how marine mammals are behaving in response to pile driving, including during soft-starts and would be sufficient to validate take estimates.

24 August **To:** National Marine Fisheries Service

Issue: Proposed amendments to regulations by the Pribilof Island Community of St. Paul Island and the Aleut Community of St. Paul Island-Tribal Government regarding subsistence harvesting of northern fur seals on St. Paul Island, Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) require the Pribilof Island Community of St. Paul Island and the Aleut Community of St. Paul Island-Tribal Government to provide a rationale for the increase in the number of fur seals they wish to harvest and an opportunity for public comment; (2) describe, or require the St. Paul community to describe, how the proposed harvest would be monitored to provide accurate information on the number of takes, when and where those takes occur, the number of seals struck and lost, the number of females taken, and whether such taking is accomplished in a non-wasteful manner; (3) deny any change in harvesting methods that would result in increased taking of female northern fur seals and the proposed use of firearms to take northern fur seals, and (4) ensure that whatever dates are approved do not lead to more than a negligible increase in the risks of taking females and do not cause unnecessary disturbance of the animals on rookeries and haul-out sites.

Agency Response: The Service had not amended the regulations or issued a final rule by the end of 2012.

27 August **To:** National Marine Fisheries Service

Issue: Draft environmental impact statement regarding the Makah Tribe's proposal to take gray whales for ceremonial and subsistence purposes

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) publish a new draft environmental impact statement on the proposal to authorize whaling by the Makah Tribe under the Marine Mammal Protection Act; (2) retain sufficient flexibility in its National Environmental Policy Act process to respond to new information or changed circumstances; and (3) either not include an adaptive management alternative in the draft environmental impact statement or, if such an alternative is included, provide an explanation of how it would be consistent with the procedural requirements of the Marine Mammal Protection Act and describe what, if any, procedural safeguards it would build into its management regime to ensure that parties to the rulemaking are ongoing participants in post-rulemaking decisions. The Commission also recommended that the Service add an

alternative that includes both temporal limits on the hunting season to avoid times when either feeding-group whales or western stock whales are most likely to be present and discuss in the new draft environmental impact statement the implications of the *Kokechik* decision for the rulemaking in the Makah Tribe's request for a waiver.

Agency Response: The Service had not issued a supplemental or final environmental impact statement by the end of 2012.

30 August **To:** U.S. Fish and Wildlife Service

Issue: Application to amend a research permit from the Monterey Bay Aquarium to conduct additional procedures on sea otters that are undergoing rehabilitation at the Aquarium

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit amendment, provided that the conditions in the current permit remain in effect.

Agency Response: The Service issued the permit amendment on 21 December 2012, consistent with the Commission's recommendation.

30 August **To:** Space and Naval Warfare Systems Center Pacific

Issue: Draft environmental assessment regarding obtaining young California sea lions for its Marine Mammal Program

Recommendation: The Commission recommended that the Navy adopt the first alternative in its environmental assessment by collecting young sea lions in poor condition from the wild.

Agency Response: The Navy had not issued its final environmental assessment by the end of 2012.

30 August **To:** National Marine Fisheries Service

Issue: Application from the Gulf of the Farallones National Marine Sanctuary to take small numbers of pinnipeds by harassment incidental to black abalone research in the Farallon Islands, 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 8 November 2012, consistent with the Commission's recommendation.

30 August **To:** National Marine Fisheries Service

Issue: Application for a research permit from PRBO Conservation Science to conduct research on pinnipeds along the central California coast 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 28 November 2012, consistent with the Commission's recommendation.

31 August **To:** Alaska Fisheries Science Center

Issue: Draft environmental impact statement regarding the issuance of quotas to the Alaska Eskimo Whaling Commission for a subsistence hunt of bowhead whales between 2013 and 2017/2018

Recommendation: The Commission recommended that the National Marine Fisheries service adopt alternative 3B and not pursue in the final environmental impact statement the possibility that the United States could authorize the continued hunting of bowhead whales by Alaska natives, even if the International Whaling Commission failed to adopt a new catch limit.

Agency Response: The Center had not issued a final environmental impact statement by the end of 2012.

4 September **To:** U.S. Fish and Wildlife Service

Issue: Application for a research permit from the U.S. Geological Survey to conduct research on polar bears in Alaska for a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, as requested.

Agency Response: The Service had not issued the permit by the end of 2012.

12 September **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 research on bird hazing methods in the Farallon National Wildlife Refuge in 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 an incidental harassment authorization on 7 November 2012, consistent with the Commission's recommendation.

17 September **To:** National Marine Fisheries Service

Issue: Application for a photography permit from Robert Pilley to film bottlenose dolphin strand-feeding events in South Carolina and Florida during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to require Mr. Pilley to (1) monitor and report all cases when filming leads to sufficient disturbance that the dolphins alter their behavior or otherwise exhibit strong response to filming or the various filming platforms and (2) cease filming if any dolphins appear to be unduly disturbed by the activity.

Agency Response: The Service issued the permit on 28 September 2012, consistent with the Commission's recommendations.

21 September **To:** National Marine Fisheries Service

Issue: Application from ION Geophysical to take small numbers of marine mammals by harassment incidental to a seismic survey in the Alaskan Beaufort and Chukchi Seas

Recommendation: The Commission recommended that the National Marine Fisheries Service continue to include proposed incidental harassment authorization language at the end of *Federal Register* notices but ensure that the language is consistent with that referenced in the main body of the corresponding notice and propose to issue regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act and a letter of authorization, rather than an incidental harassment authorization, for any proposed activities expected to cause a permanent threshold shift. The Commission also recommended that the Service require ION to (1) consult with the Service's National Marine Mammal Laboratory and other researchers and revise its expected density estimates for gray whales and bearded seals to reflect new information from passive acoustic recordings and include, as appropriate, an estimate of takes by Level A harassment for those species and (2) recalculate expected densities for bowhead whales based on (a) the corrected decrease in abundance of bowhead whales reported by Miller et al. (2002) for early and late October (i.e., 78 percent) and (b) any additional information from more recent surveys, including acoustical surveys, conducted by the Service's National Marine Mammal Laboratory and other researchers to assess the distribution and relative abundance of bowhead whales in the survey area from October through December. In addition, the Commission recommended that the Service provide stronger assurance that the actual number of takes would be negligible by (1) estimating the expected number of takes plus some measure of uncertainty in that estimate, (2) using maximum estimated densities of the marine mammals in the survey area to estimate takes, or (3) using some comparable approach that accounts for uncertainty and provides a high level of assurance that the actual taking would, in fact, be negligible. The Commission further recommended that the Service require ION to (1) revise the estimated number of Level A harassment takes to include all marine mammals that may be exposed to source levels greater than or equal to 180 and 190 dB re 1 µPa (for cetaceans and pinnipeds, respectively); (2) account for all sources of uncertainty in its estimation approach, including animals that may be present but not observed; (3) provide a scientific basis for any conclusions about the animals' responses to the airguns; and (4) base its negligible impact determination on the revised estimated number of Level A harassment takes. Regarding mitigation and monitoring, the Commission recommended that the Service require ION to (1) record, analyze, and report (within five days of collecting the data) the results of measurements of vessel sounds and adjust the size of the 120-dB re 1 µPa harassment zone and revise the estimated number of animals expected to be taken by Level B harassment for all icebreaking activities, as necessary; (2) use passive and active acoustic monitoring to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound; (3) specify reduced vessel speeds of 9 knots or less when in transit and 5 knots or less when weather conditions or darkness reduce visibility; and (4) establish and monitor adequately both a 160- and a 120-dB re 1 µPa disturbance zone around all sound sources and to not initiate or continue an activity if (a) an aggregation of bowhead whales or gray whales is observed within the 160-dB re 1 µPa zone or (b) a female-calf pair is observed within the 120-dB re 1 µPa zone.

Agency Response: The Service issued the incidental harassment authorization on 17 October 2012, consistent with none of the Commission's recommendations. However, the Service stated that the legal requirements and underlying analysis for the issuance of an incidental harassment authorization in this case do not require the issuance of regulations and a letter of authorization, because marine mammals would avoid staying close to the sound source long enough to result in permanent hearing loss. The Service did not revise its expected density estimates for gray whales and bearded seals or include an estimate of takes by Level A harassment for those species, because although some marine mammals were detected in the Beaufort and Chukchi Seas using passive acoustic recorders during the proposed survey season, none of the studies allowed for the calculation of specific density estimates. The Service also did not adjust the density estimates for bowhead whales, because its analyses and negligible impact determination incorporated uncertainties regarding marine mammal winter distribution. Regarding the Commission's recommendation to revise the estimated numbers of Level A harassment takes, the Service believed that even those animals that experience permanent threshold shift would not be seriously injured. Therefore, it did not revise numbers of those takes.

In addition, the Service stated that ION would conduct sound source verification for the airgun array in open water, but that those open-water conditions would not be a good indicator for measuring icebreaking sound. Therefore, ION would use its hydrophone streamer to measure the vessel sound associated with icebreaking. The Service also indicated that, because the 160–dB re 1 µPa harassment zone for the airgun array would surpass the 120–dB re 1 µPa harassment zone for icebreaking activities, it used the 160–dB re 1 µPa harassment zone to determine the numbers of marine mammal takes. Regarding mitigation measures, the Service did not require ION to establish and monitor a 160-dB re 1 µPa zone for aggregations of bowhead and gray whales or a 120-dB re 1 µPa zone for female-calf pairs, because it expects very few exposures of whales during the survey period. Finally, the Service believed that the reduced vessel speeds and passive and active acoustic monitoring were not necessary or practicable and did not require them.

24 September **To:** National Marine Fisheries Service

Issue: Application for a research permit from the Alaska Department of Fish and Game to collect, receive, import, and export samples from up to 26 species of cetaceans or pinnipeds during a five-year period.

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but require the Department to (1) provide documentation sufficient to demonstrate that each sample to be imported 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 and (2) maintain detailed records indicating the source of each specimen and the circumstances under which it was collected.

Agency Response: The Service had not issued the permit by the end of 2012.

24 September **To:** U.S. Fish and Wildlife Service

Issue: Application for a research permit from Shannon Atkinson, Ph.D., to acquire and possess samples from northern sea otters during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, as requested.

Agency Response: The Service had not issued the permit by the end of 2012.

26 September **To:** National Marine Fisheries Service

Issue: Application from the California Department of Transportation to take small numbers of marine mammals by harassment incidental to construction activities associated with replacement of the east span of the San Francisco-Oakland Bay Bridge

Recommendation: The Commission recommended that the National Marine Fisheries Service promulgate regulations and condition them to require further public review if the Department or contractor proposes any substantial changes to the project plan and require the Department to implement full-time monitoring of Level A and B harassment zones during all in-water sound-producing activities

Agency Response: The Service had not issued the incidental harassment authorization by the end of 2012.

1 October **To:** U.S. Department of Commerce

Issue: Draft policy on American Indian and Alaska Native consultation and coordination

Recommendation: The Commission recommended that the Department of Commerce revise its draft tribal consultation policy to (1) include reference to the policymaking criteria outlined in Executive Order 13175 and explain how it will apply those criteria when formulating and implementing policies that have tribal implications; (2) provide additional guidance on the process it will use to determine whether policies have tribal implications and when consultation would be impracticable or precluded by other legal requirements, and include examples of Department actions that have been subject to consultation in the past; (3) provide more detailed guidance on how consultations will be conducted to ensure meaningful and timely input by tribal officials; (4) include specific guidance for consultation and the preparation of tribal impact summary statements for regulations that are not required by statute but have tribal implications and impose substantial direct compliance costs on tribal governments,, preempt tribal law, or both; (5) require that the Department's tribal consultation official or his or her designee certify to the Office of Management and Budget that any draft final regulation or proposed legislation that has tribal implications is in compliance with Executive Order 13175; and (6) include reference to and consider relevant regulations, statutes, Presidential memoranda, Executive Orders, and other documents with bearing on tribal consultations.

Agency Response: The Service had not issued the final policy by the end of 2012.

2 October **To:** National Marine Fisheries Service

Issue: Revision to National Standard 1 Guidelines that affect the conservation and protection of marine mammals.

Recommendation: The Commission recommended that the National Marine Fisheries Service modify the National Standard 1 Guidelines to (1) include a more complete range of ecosystem-based fishery management principles, objectives, and practical approaches

in the development of fishery management plans and in the determination of optimum yield for each stock being managed, especially those approaches that preserve and restore ecosystem resilience, integrity, and function and (2) consider more explicitly competition between fisheries and other ecosystem consumers including marine mammals by requiring (a) assessment for each fished stock of the extent and significance of competition between the fishery and the other ecosystems consumers, (b) monitoring and assessment to resolve uncertainties about the ecological effects of such competition, and (c) continuing efforts to develop and validate multi-species models so that they might be used to explore the potential ecological consequences of fishing on marine ecosystems. The Commission also recommended that the Service ensure the protection of forage fish and the species that depend on them by (1) requiring the adoption of precautionary management strategies for any forage fish fisheries and (2) specifying risk-averse guidelines, biological reference points, and yield quotas for those species, as recommended by Pikitch et al. (2012) and expand the approach to setting optimum yield by (1) requiring the clarification and thorough evaluation of specific economic, social, and ecological factors that might affect the setting of optimal yield, (2) providing options for the quantification of those factors in relation to yield, (3) requiring the setting of optimum yield based on the evaluation and quantification of those factors, (4) integrating the concept and setting of optimum yield with the framework used to set catch limits and targets framework, and (5) providing guidance on the above to achieve consistency among councils and a convergence on a set of best practices. In addition, the Commission recommended that the Service require more realistic assessment and incorporation of uncertainty in stock assessments and fishery management practices by (1) identifying best practices in estimating and incorporating scientific and management uncertainty, (2) fostering greater consistency among councils in following those best practices, (3) requiring the estimation of management uncertainty associated with both controlling catch levels and quantifying true catch, regardless of the accountability measures used, and (4) providing guidance on the adjustment of the acceptable biological catch or annual catch limit to account for pertinent biological and ecological factors not incorporated into the stock assessment model and scientific uncertainty in the overfishing limit.

Agency Response: The Service had not revised the guidelines or issued final guidelines by the end of 2012.

9 October **To:** U.S. Fish and Wildlife Service

Issue: Application for a public display permit from SeaWorld to import one female captive-born walrus from Kamogawa SeaWorld in Kamogawa, Japan

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 plans and facilities for transporting and maintaining the walrus meet the requirements established under the Animal Welfare Act and are adequate to provide for its health and well-being.

Agency Response: The Service had not issued the permit by the end of 2012.

9 October **To:** National Marine Fisheries Service

Issue: Application from the PRBO Conservation Science to take small numbers of marine mammals by harassment incidental to conducting seabird and pinnipeds research activities on Southeast Farallon Island, Año Nuevo Island, and Point Reyes National Seashore, California

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the requested incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures.

Agency Response: The Service issued the incidental harassment authorization 7 December 2012, consistent with the Commission's recommendation.

11 October **To:** U.S. Fish and Wildlife Service

Issue: Application from the Pacific Gas and Electric Co. and Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to a marine geophysical survey near a nuclear power plant near Morro Bay, California

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service incorporate in the authorization all stipulated mitigation and monitoring measures and provide greater assurance that no more than small numbers of sea otters will be taken and that the overall impact will be negligible by basing its determinations on (1) the estimated mean number of otters in the area that may be taken plus some measure of uncertainty in that estimate or (2) the estimated maximum number of sea otters in the survey area that may be taken. The Commission also recommended that the Service provide additional justification for its preliminary determination that the proposed vessel-based monitoring program will be sufficient to detect all marine mammals within or entering the identified exclusion and buffer zones and implement any reduction in the exclusion zone cautiously by (1) specifying the criteria that need to be met for warranting such a reduction, (2) reducing the zone only after a sufficient sample of otters have been observed within the zone so that the Service has a reasonable basis for assessing their response, (3) reducing the zone in relatively small increments (e.g., from 1,000 to 800 m), and (4) requiring intensive monitoring of nearshore areas and shorelines when those areas are surveyed to ensure a reasonable probability of detecting otters that are disturbed.

Agency Response: Pacific Gas and Electric Co. and Lamont-Doherty Earth Observatory withdrew their application for an incidental harassment authorization on 28 November 2012, because the California Coastal Commission did not issue them a coastal development permit-federal consistency certification for the proposed activities.

11 October **To:** National Marine Fisheries Service

Issue: Application from the Pacific Gas and Electric Co. and Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to a marine geophysical survey near a nuclear power plant near Morro Bay, California

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) require Pacific Gas and Electric Co. and the Observatory to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals for the mitigation airgun using a model that incorporates site-specific information—if the exclusion and buffer zones and numbers of takes are not re-estimated, require them to provide a detailed justification explaining the rationale for basing the exclusion and buffer zones for the

mitigation airgun on modeling results based on measurements made in the Gulf of Mexico. The Commission also recommended that the Service provide greater assurance that no more than small numbers of each marine mammal species in the area will be taken and that, for each species or stock, the overall impact will be negligible by basing its determinations on (1) the estimated mean number of individuals of each species in the area that may be taken plus some measure of uncertainty for each species or (2) the estimated maximum number of each species in the survey area that may be taken and provide a clear justification for concluding that, in this authorization, taking as much as 15 to 26 percent of a species or stock constitutes small numbers and develop a policy that sets forth the criteria for determining what constitutes "small numbers" for the purpose of authorizing incidental takes of marine mammals by working independently or jointly with the U.S. Fish and Wildlife Service and Marine Mammal Commission. In addition, the Commission recommended that the Service revise its mitigation measures by (1) retaining the requirement for a 15-minute halt to airgun operations if a small odontocete or pinniped enters the exclusion zone but is not observed outside the exclusion zone; (3) requiring a halt to airgun operations based on the maximum dive times when mysticetes or large odontocetes enter the exclusion zone; and (3) eliminating the option to resume airgun operations after 8 minutes if the sound source is moving and the marine mammal has not been observed outside the exclusion zone. The Commission further recommended that the Service (1) provide additional justification for its preliminary determination that the proposed vessel-based monitoring program will be sufficient to detect all marine mammals within or entering the identified exclusion and buffer zones; (2) require Pacific Gas and Electric Co. and the Observatory to (a) report the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated, (b) specify if such animals also were detected visually, (c) compare the results from the two monitoring methods (visual versus acoustic) to help identify their respective strengths and weaknesses, and (d) use that information to improve mitigation and monitoring methods for future authorizations; and (3) work with the National Science Foundation to analyze existing data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys.

Agency Response: Pacific Gas and Electric Co. and Lamont-Doherty Earth Observatory withdrew their application for an incidental harassment authorization on 5 December 2012, because the California Coastal Commission did not issue them a coastal development permit-federal consistency certification for the proposed activities.

19 October **To:** National Marine Fisheries Service

Issue: Draft environmental impact statement evaluating Steller sea lion protection measures imposed on the Alaska groundfish fisheries

Recommendation: The Commission recommended that the National Marine Fisheries Service focus its required environmental impact statement on a full analysis of fisheries effects on Steller sea lions (especially the effects of intentionally reducing target stock biomass by 60 percent or more), which is necessary if the Service is to identify clearly the potential ecological effects of its fishing strategy based on the maximum sustainable yield and develop the type of adaptive management approach that is needed to characterize and manage those effects.

Agency Response: The Service had not issued a supplemental or final environmental impact statement by the end of 2012.

25 October **To:** National Marine Fisheries Service

Issue: Application from Port Dolphin Energy LLC to take small numbers of marine mammals incidental to construction and operation of an offshore liquefied natural gas facility, Port Dolphin Deepwater Port, in the Gulf of Mexico

Recommendation: The Commission recommended that the National Marine Fisheries Service provide greater assurance that no more than small numbers of each marine mammal species in the area will be taken and that, for each species or stock, the overall impact will be negligible by basing its determinations on (1) the estimated mean number of individuals of each species in the area that may be taken plus some measure of uncertainty for each species or (2) the estimated maximum number of each species in the project area that may be taken. The Commission also recommended that the Service require Port Dolphin to expand the size of the Level A harassment zone for buoy installation, pipeline burial, and pipe laying activities to at least 200 m; submit the preliminary results of its in-situ sound source measurements to the Service and adjust the size of the Level A and B harassment zones, as necessary, within five days after it initiates construction activities; and monitor the full extent of the Level A and B harassment zones to detect the presence and characterize the behavior of marine mammals during all construction activities. In addition, the Commission recommended that the Service require Port Dolphin to install and maintain passive acoustic monitoring equipment at the proposed port to (1) determine ambient (pre-construction), construction, and operational (post-construction) sound levels and (2) monitor the occurrence of marine mammals in the vicinity of the port and provide the Service and the Gulf of Mexico Coastal Ocean Observing System with those sound measurements.

Agency Response: The Service had not issued the final rule by the end of 2012.

29 October **To:** National Marine Fisheries Service

Issue: Application for a public display permit from Georgia Aquarium Inc. to import 18 beluga whales from Russia for a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service consult with the Animal and Plant Health Inspection Service to ensure that Georgia Aquarium's plans and facilities for transporting and maintaining the whales meet the requirements established under the Animal Welfare Act and other applicable laws and are adequate to provide for the whales' health and well-being. If that is the case, then the Commission recommended that the Service issue the permit but (1) condition it to require the Aquarium to develop a contingency plan that will allow for removing the beluga whales from their transport containers and placing them into a less stressful environment and providing veterinary care if (a) the Brussels transfer or any flight is disrupted or delayed or (b) any whale shows signs of clinical illness during transport; (2) strongly encourage the Aquarium to continue its support for research on the Sakhalin-Amur population of beluga whales to obtain a more accurate and precise assessment of its genetic status, its abundance and trend, and the significance of other risk factors that may affect its conservation status; and (3) strongly encourage the Aquarium to advance a program of public education and outreach on the conservation of belugas worldwide, especially pertaining to the impacts of increasing human activities on the sub-arctic and Arctic populations.

Agency Response: The Service had not issued the permit by the end of 2012.

5 November **To:** National Marine Fisheries Service

Issue: Application from the Navy to take marine mammals incidental to training and research, development, testing, and evaluation activities within the Hawaii-Southern California training and testing study area

Recommendation: The Commission recommended that, prior to publishing the proposed rule, the National Marine Fisheries Service require the Navy to expand its application by including a discussion of the natural history and status of, and threats to, North Pacific right whales and encourage the Navy to undertake research to determine whether North Pacific right whales use or regularly migrate through the Navy's training and testing study area in the Pacific during fall and winter months. The Commission also recommended that the Service require the Navy to (1) adjust all acoustic and explosive thresholds for low-, mid-, and high-frequency cetaceans by the appropriate amplitude factor (e.g., 16.5 or 19.4 dB), if it intends to use the type II weighting functions as depicted in Figure 6 of Finneran and Jenkins (2012); (2) explain why data from Kastak et al. (2005) were used as the basis for explosive thresholds in pinnipeds and, more importantly, to specify the extrapolation process and factors used as the basis for associated TTS thresholds; (3) provide detailed information regarding how it determined marine mammal takes that occur when multiple types of sound-producing sources (i.e., acoustic, explosive, and non-explosive impulsive) of varying frequencies (i.e., low, mid, and high) are used simultaneously; and (4) use its spatially and temporally dynamic simulation models to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedo, unmanned underwater vehicles and expended munitions, ordnance, and other devices). In addition, the Commission recommended that the Service require the Navy to (1) provide the predicted average and maximum ranges for all criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), all activities (i.e., based on the activity category and representative source bins), and all functional hearing groups of marine mammals; (2) use passive and active acoustics to supplement visual monitoring during the implementation of its mitigation measures for all activities that introduce sufficient levels of sound into the marine environment; (3) cease the use of its sound sources and not reinitiate them for (a) at least 15 minutes if a small odontocete or pinniped enters the mitigation zone and is not observed to leave that zone and (b) relevant time periods based on the maximum dive times of mysticetes or large odontocetes if they enter the mitigation zone and are not observed to have left that zone; and (4) adjust the size of the mitigation zone for mine neutralization events using the average swim speed of the fastest swimming marine mammal occurring in the area where time-delay firing devices would be used to detonate explosives. Finally, the Commission recommended that the Service not allow the Navy to reduce its estimated numbers of Level A harassment and mortality takes based on its proposed post-model analysis and, instead, propose to authorize the total numbers of model-estimated Level A harassment and mortality takes.

Agency Response: The Service had not issued the proposed rule by the end of 2012.

5 November **To:** National Marine Fisheries Service

Issue: Application from the Navy to take marine mammals incidental to training and research, development, testing, and evaluation activities within the Atlantic Fleet training and testing study area

Recommendation: The Commission recommended that, prior to publishing the proposed rule, the National Marine Fisheries Service require the Navy to (1) adjust all acoustic and explosive thresholds for low-, mid-, and high-frequency cetaceans by the appropriate amplitude factor (e.g., 16.5 or 19.4 dB), if it intends to use the type II weighting functions as depicted in Figure 6 of Finneran and Jenkins (2012); (2) explain why data from Kastak et al. (2005) were used as the basis for explosive thresholds in pinnipeds and, more importantly, to specify the extrapolation process and factors used as the basis for associated TTS thresholds; (3) provide detailed information regarding how it determined marine mammal takes that occur when multiple types of sound-producing sources (i.e., acoustic, explosive, and non-explosive impulsive) of varying frequencies (i.e., low, mid, and high) are used simultaneously; and (4) use its spatially and temporally dynamic simulation models to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedo, unmanned underwater vehicles and expended munitions, ordnance, and other devices). The Commission also recommended that the Service require the Navy to (1) provide the predicted average and maximum ranges for all criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), all activities (i.e., based on the activity category and representative source bins), and all functional hearing groups of marine mammals; (2) use passive and active acoustics to supplement visual monitoring during the implementation of its mitigation measures for all activities that introduce sufficient levels of sound into the marine environment; (3) cease the use of its sound sources and not reinitiate them for (a) at least 15 minutes if a small odontocete or pinniped enters the mitigation zone and is not observed to leave that zone and (b) relevant time periods based on the maximum dive times of mysticetes or large odontocetes if they enter the mitigation zone and are not observed to have left that zone; and (4) adjust the size of the mitigation zone for mine neutralization events using the average swim speed of the fastest swimming marine mammal occurring in the area where time-delay firing devices would be used to detonate explosives. Finally, the Commission recommended that the Service not allow the Navy to reduce its estimated numbers of Level A harassment and mortality takes based on its proposed post-model analysis and, instead, propose to authorize the total numbers of model-estimated Level A harassment and mortality takes.

Agency Response: The Service had not issued the proposed rule by the end of 2012.

5 November **To:** National Marine Fisheries Service

Issue: Application for a research permit from the Northeast Fisheries Science Center to conduct research on 37 specified cetacean species and unidentified *Mesoplodon* spp. in waters of the exclusive economic zones of the United States and Canada from Florida to the Scotian Shelf during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to require the Center 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 Service.

Agency Response: The Service had not issued the permit by the end of 2012.

5 November **To:** National Marine Fisheries Service

Issue: Application for a research permit from Mystic Aquarium to collect, 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 but require the Aquarium to (1) provide documentation sufficient to demonstrate that each sample to be imported 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 and (2) maintain detailed records indicating the source of each specimen and the circumstances under which it was collected.

Agency Response: The Service had not issued the permit by the end of 2012.

13 November **To:** National Marine Fisheries Service

Issue: Application for a research permit from Dan Engelhaupt, Ph.D., to conduct systematic line transect surveys for marine mammals in the Atlantic and Pacific Oceans during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the requested permit but (1) condition it to require Dr. Engelhaupt 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 (2) ensure that activities to be conducted under this permit and those of other permit holders who might be surveying the same species in the same areas are coordinated and, as possible, data and samples are shared to avoid duplicative research and unnecessary disturbance of animals.

Agency Response: The Service had not issued the permit by the end of 2012

13 November **To:** National Marine Fisheries Service

Issue: Application from the Partnership for the Interdisciplinary Study of Coastal Oceans at the University of California Santa Cruz to take marine mammals by harassment incidental to rocky intertidal monitoring activities along the California and Oregon coasts

Recommendations: The Commission recommended that the National Marine Fisheries Service issue the requested incidental harassment authorization subject to inclusion of the proposed mitigation and monitoring measures and after revising the number of takes in the take table to be consistent with the take estimation method in the text of the application.

Agency Response: The Service issued the incidental harassment authorization on 3 December 2012, consistent with the Commission's recommendations.

14 November **To:** National Marine Fisheries Service

Issue: Draft 2012 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) convene a workshop or series of workshops to explore novel ideas for detecting entanglements and ship strikes, improving information on their frequency and trends, reducing the bias in estimates of large whale mortality and serious injury caused by these interactions, and considering possible options for addressing these risk factors; (2) in conjunction with the U.S. Fish and Wildlife Service,

more completely assess human effects on marine mammals by (a) developing a framework for describing the full effects, both direct and indirect, of all human activities that may cause serious injury or mortality of marine mammals and then (b) incorporating that framework into stock assessment reports so that decision-makers are informed not only about the known information on a stock, but also about the degree of uncertainty regarding the other risk factors that may be affecting the stock's status and what would be required to reduce that uncertainty; (3) consider the feasibility and advisability of providing explicit technical guidance on trend analysis and, for each stock assessment with no trend analysis, require an explicit explanation for why such an analysis could not be completed; and (4) establish an internal review process to standardize the updating of the reports within and across regions, and consider using a copy editor to check for completeness, errors, and consistency.

To improve stock assessment efforts in the Atlantic and Gulf of Mexico, the Commission recommended that the Service (1) expand Table 2 in the North Atlantic right whale report to include right whale #3903 as a serious injury and the unidentified dead right whale seen on 18 May 2006 as an entanglement-related mortality, and recalculate the five-year average of entanglement-related mortality and serious injury; (2) expand the section of the report on right whale fishery-related mortality and serious injury to include the total number of entanglements between 2006 and 2012; (3) expand the report for the Gulf of Maine harbor porpoise either to include a trend analysis and explanation or describe the reasons that the analysis and explanation cannot be provided—if the latter, then the Service also should explain how it plans to rectify the problem(s); (4) contact Canadian officials to (a) determine the feasibility of an analysis of port catch levels to estimate the number of harbor porpoises caught in the Canadian Bay of Fundy sink gillnet fishery since 2002 and (b) pursue the development of a reliable means for estimating harbor porpoise bycatch in the Canadian Bay of Fundy; and (5) conduct the required surveys of the western North Atlantic harbor and gray seal stocks, incorporate the results into the stock assessment reports, and use that information in its management of those stocks and the risk factors affecting them.

To improve stock assessment efforts in the Alaska region, the Commission recommended that the Service (1) meet with the Commission to discuss the impending changes in the Arctic and consider the development of (a) a long-term assessment strategy to characterize population abundance, stock status, and ecological and human interactions as climate disruption continues and (b) a long-term management strategy that anticipates the risks to ice seals and develops pro-active measures to avoid or minimize those risks; (2) continue 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) revise its stock assessments for the north Kodiak, south Kodiak, and Cook Inlet harbor seal stocks by (a) reducing the recovery factor to be consistent with the Service's 2005 guidelines, (b) recalculating its potential biological removal values, (c) updating the stock assessment reports accordingly, including changing the status of the north Kodiak stock, and (d) working with Native communities to ensure that harvest numbers, when combined with other human-related serious injuries and deaths, do not exceed the potential biological removal for the north Kodiak stock; (4) conduct the research needed to (a) analyze and describe the risks to North Pacific right whales associated with increasing shipping traffic in the Bering Sea and North Pacific, paying particular attention to Unimak Pass, and of entanglement in fishing gear and (b) use that information to design management measures that will minimize the risk of ship strikes and entanglement and ensure its activities do not significantly increase

the risk faced by the whales; (5) make every effort to expedite the analysis of all passive acoustic, satellite telemetry, and other data available for North Pacific right whales, update the stock assessment report accordingly, and use those data to develop protective measures for this population; and (6) revise the stock assessment report for the North Pacific right whale stock to indicate that based on knowledge of migratory patterns of similar species, Hawaii and Mexico could be low latitude habitats used more regularly by North Pacific right whales than currently recognized.

To improve stock assessment efforts in the Pacific, the Commission recommended that the Service (1) first verify that compliance with the measures of the 1997 take reduction plan for sperm whales remains at a high level and monitor any changes in fishery effort that might systematically affect entanglement risk, and then reconvene the take reduction team only if either of those efforts reveal deficiencies; (2) continue to plan and request funding for the necessary surveys to estimate abundance of Pacific Coast harbor seals but also consider alternative assessment approaches to update stock assessment reports for harbor seals along the Pacific coast; and (3) review all available information on stock structure for Pacific Island stocks of melon-headed whales, pantropical spotted dolphins, and rough-toothed dolphins and update the stock assessment reports accordingly.

Agency Response: The Service had not issued the final stock assessment reports by the end of 2012.

11 December **To:** U.S. Fish and Wildlife Service

Issue: Application for a public display permit from the Alaska SeaLife Center to change the authorization for up to two non-releasable rehabilitated northern sea otters per year from section 109(h) of the Act to section 104(c) and then export the otters to foreign facilities that meet the Act's comparability requirements during a five-year period

Recommendations: The Commission recommended that the U.S. Fish and Wildlife Service issue the requested public display permit, provided that the Service, in consultation with the Animal and Plant Health Inspection Service, is satisfied that the Center's facilities for maintaining the sea otters meet the requirements established under the Animal Welfare Act and are adequate to provide for the animals' health and well-being. Further, the Commission recommended that the Service authorize subsequent transfers to foreign facilities of sea otters maintained under the Center's permit, provided that it (1) determines, in consultation with the Animal and Plant Health Inspection Service, that the plan for transporting the animals is appropriate and the recipient facility meets requirements comparable to those established under the Animal Welfare Act and is adequate to provide for the animals' health and well-being; and (2) obtains a statement from the responsible government official in the recipient country that comity will be given to applicable U.S. requirements and laws concerning the care and maintenance of the otters.

Agency Response: The Service had not issued the permit by the end of 2012.

21 December **To:** National Marine Fisheries Service

Issue: Application for a research permit from the Northeast Fisheries Science Center to conduct research on pinnipeds during a five-year period

Recommendations: The Commission recommended that National Marine Fisheries Service issue the requested permit, but condition it to (1) limit authorization for extracting teeth to experienced researchers only and require them to submit their curricula vitae to the Service prior to conducting the proposed activities; (2) limit the total (five-year) number of

unintentional deaths to 1 percent of the individuals captured—the Service could include some variability in the annual limit to allow research to continue under unfavorable conditions (e.g., up to two harbor seal pups per year not to exceed five harbor seal pups during the five-year period); and (3) require that the Center scientists coordinate activities to be conducted under this permit with those of other permit holders or Canadian researchers who might be conducting research on the same species in the same areas and, as possible, share data and samples to avoid duplicative research and unnecessary disturbance of animals.

Agency Response: The Service had not issued the permit by the end of 2012.

Appendix B

2012 PUBLICATIONS FROM COMMISSION-SPONSORED ACTIVITIES

Baker, C.S., R.M. Hamner, J. Cooke, D. Heimeier, M. Vant, D. Steel and R. Constantine. 2012. Low abundance and probable decline of the critically endangered Maui's dolphin estimated from genotyping capture-recapture. Animal Conservation. DOI: 10.1111/j.1469-1795.2012.00590.x. (MMC grant with the National Fish and Wildlife Foundation, NFWF project #2010-0073-004)

Beasley, I., K. Pollock, T.A. Jefferson, P. Arnold, L. Morse, S. Yim, S. Lor Kim, and H. Marsh. 2012. Likely future extirpation of another Asian river dolphin: The critically endangered population of the Irrawaddy dolphin in the Mekong River is small and declining. Marine Mammal Science. DOI: 10.1111/j.1748-7692.2012.00614. (MMC grant E4047696)

Braulik, G.T., A.P. Reichert, T. Ehsan, S. Khan, S.P. Northridge, J.S. Alexander, R. Garstang. 2012. Habitat use by a freshwater dolphin in the low-water season. Aquatic Conservation: Marine and Freshwater Ecosystems. 22: 533-546. (MMC grant E4047595)

Eberhardt, L. L., and J. M. Breiwick. 2012. Models for Population Growth Curves. ISRN Ecology 2012: 1–7. (MMC grant E4061654)

Hamner, R.M., F.B. Pichler, D. Heimeier, D. Steel, and C.S. Baker. 2012. Genetic differentiation and limited gene flow among fragmented populations of New Zealand endemic Hector's and Maui's dolphins. Conservation Genetics. 13(4): 987–1002. (MMC grant with the National Fish and Wildlife Foundation, NFWF project #2010-0073-004)

Harvey, H.T. & Associates. 2012. Workshop to identify significant uncertainties concerning the effects of climate change and the Antarctic Toothfish Fishery on the Ross Sea marine ecosystem. 27-30 March 2012, La Jolla, CA. (MMC grant 12-074)

Hückstädt, L.A., J.M. Burns, P.L. Koch, B.I. McDonald, D.E. Crocker, D.P. Costa. 2012. Diet of a specialist in a changing environment: the crabeater seal along the western Antarctic Peninsula. Marine Ecology Progress Series 455: 287-301. (MMC grant E4047610)

Hückstädt, L.A., P.L. Koch, B.I. McDonald, M.E. Goebel, D.E. Crocker, D.P. Costa. 2012. Stable isotope analyses reveal individual variability in the trophic ecology of a top marine predator, the southern elephant seal. Oecologia 169 (2): 395-406. (MMC grant E4047610)

Klinck, H., S. L. Nieukirk, D. K. Mellinger, K. Klinck, H. Matsumoto, R. P. Dziak. 2012. Seasonal presence of cetaceans and ambient noise levels in polar waters of the North Atlantic. Journal of the Acoustical Society of America 132 (3): EL176: EL181. (MMC grant with the National Fish and Wildlife Foundation, NFWF project #2010-0073-003)

Kot, B. W., R. Sears, A. Anis, D. P. Nowacek, J. Gedamke, C. D. Marshall. 2012. Behavioral responses of minke whales (*Balaenoptera acutorostrata*) to experimental fishing gear in a coastal environment. Journal of Experimental Marine Biology and Ecology 413 13-20. (MMC grant with the National Fish and Wildlife Foundation, NFWF project #2010-0073-006)

Kovacs, K.M., A. Aguilar, D. Aurioles, V. Burkanov, C. Campagna, N. Gales, T. Gelatt, S.D. Goldsworthy, S.J. Goodman, G.J.G. Hofmeyr, T. Härkönen, L. Lowry, C. Lydersen, J. Schipper, T. Sipilä, C. Southwell, S. Stuart, D. Thompson, and F. Trillmich. 2012. Global threats to pinnipeds. Marine Mammal Science 28(2): 414-436. (MMC grant E4047341)

Moore, J. E. 2012. Management reference points to account for direct and indirect impacts of fishing on marine mammals. Marine Mammal Science. DOI: 10.1111/j.1748-7692.2012.00586. (MMC grant E4047333)

Popper, A.N. and A. Hawkins (eds.) 2012. The Effects of Noise on Aquatic Life. Advances in Experimental Medicine and Biology 730. Springer, New York, NY. (MMC grant E4047608)

Trukhanova, I.S., R.A. Sagitov, M.V. Verevkin, V.A. Alekseev, E.M. Andrievskaya. 2012. Ladoga ringed seal and fisheries: Background for social, ecological, and economical strain development. Terra Humana 23 (2): 232-238. (MMC grant E4062065) (In Russian with English abstract).

Turvey, S.T., C.L. Risley, L.A. Barrett, H. Yujiang, W. Ding. 2012. River dolphins can act as population trend indicators in degraded freshwater systems. PLoS ONE 7 (5): e37902. (MMC grant E4041038)

Vongraven, D., J. Aars, S. Amstrup, S.N. Atkinson, S. Belikov, E.W. Born, T.D. DeBruyn, A.E. Derocher, G. Durner, M. Gill, N. Lunn, M.E. Obbard, J. Omelak, N. Ovsyanikov, E. Peacock, E. Richardson, V. Sahanatien, I. Stirling, Ø Wiig. 2012. A circumpolar monitoring framework for polar bears. Ursus Monograph Series Number 5: 1-66. (MMC grant E4061734)

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