Marine Mammal Science and Conservation Priorities for the National Marine Fisheries Service

Final report prepared by the Marine Mammal Commission

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Vaquita

Photo by Thomas A. Jefferson from the joint research project with the Coordinación de Investigación y Conservación de Mamíferos Marinos/Dr. Lorenzo Rojas Bracho of the Instituto Nacional de Ecología (INE) in Ensenada.

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I. Introduction – Purpose of this report

The primary mission of the Marine Mammal Commission (the Commission) is to oversee implementation of the Marine Mammal Protection Act (MMPA), which promotes the conservation of marine mammals and the ecosystems of which they are a part. Recognizing that increased funding alone will not ensure that the goals of the MMPA are achieved, the Commission undertook a "Priorities Project" to assist agencies in identifying the Nation's most pressing marine mammal science and management needs. This report, which summarizes the findings of the Priorities Project, is intended to advise Congress, the Office of Management and Budget, the Department of Commerce including the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service (NMFS),[1] and the American public. The overall objective is to provide guidance to those involved in funding decisions to enhance the effectiveness of research and management actions focused on the conservation of marine mammals and marine ecosystems.

Much has changed since the MMPA was enacted in 1972, including the nature of threats to marine mammals and the tools and approaches needed to tackle new challenges. Notably, intentional takes of marine mammals have declined substantially, with a few important exceptions in certain parts of the world. Bycatch in commercial fisheries remains the greatest and most immediate threat to marine mammal populations. The threat has been, and continues to be, addressed aggressively in most U.S. domestic fisheries, but this is not true in much of the world. In the meantime, there is a growing awareness of indirect impacts from various anthropogenic sources, with causes and solutions that are much more difficult to pinpoint and address. These indirect impacts include those from climate change, non-point-source pollution, ocean ensonification and acidification, and offshore energy development. Importantly, many of these threats can also affect humans; therefore, addressing the health of marine mammals and their ecosystems can be linked to identifying and understanding human health concerns. The broader scope of challenges recognized today makes it necessary to enlist the help of a wider array of federal agencies and collaborators, many of which might not have been a part of the effort 40 years ago. The goal of this report is two-fold; to highlight that existing funding is insufficient to accomplish the mandates of the MMPA and related legislation and to provide

[1] In addition to NMFS, the U.S. Fish and Wildlife Service (FWS) has primary responsibility for the management and conservation of certain marine mammals (manatees, sea otters, walruses, and polar bears). Although the prioritization principles and criteria outlined in this report could prove useful to FWS, the report's explicit focus on NMFS reflects the fact that the Commission's limited resources allowed it to carry out extensive consultations with only one of the two lead agencies responsible for MMPA implementation and NMFS has many more species under its mandate than FWS.

guidance to decision makers on the principles and criteria that the Commission believes should be used to establish priorities that make the best use of limited funds. In addition, the Commission provides a recommended list of priorities generated from these principles and criteria.

II. Overview of the MMPA and Other Statutory Mandates

The establishment of priorities for marine mammal research and management activities in the United States needs to be guided by the mandates in applicable laws. The two principal statutes to consider are the MMPA and the Endangered Species Act (ESA), although other laws such as the National Environmental Policy Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Outer Continental Shelf Lands Act provide tools that can be used to address threats and promote marine mammal conservation in specific situations.

The MMPA has a broad mandate to protect and conserve marine mammals. Congress directed that marine mammal species and stocks[2] should not be permitted to diminish beyond the point at which they cease to be significant functioning elements in the ecosystems of which they are a part. Toward that end, Congress found that the primary objective of marine mammal management should be to "maintain the health and stability of the marine ecosystem" and, when consistent with that objective, to maintain marine mammals at their optimum sustainable population (OSP) levels.[3] Congress particularly noted the need to take immediate action to facilitate the recovery of any species or stock already below OSP and to protect essential habitats such as rookeries, mating grounds, and important feeding areas. Congress emphasized the need for research, finding that "there is inadequate knowledge of the ecology and population dynamics of marine mammals and the factors which bear upon their ability to reproduce themselves successfully." In addition, Congress was clear that the scope of the MMPA was not limited to domestic species, directing that negotiations "be undertaken immediately to encourage the development of international arrangements for research on, and conservation of, all marine mammals."

Despite these lofty objectives and policies, the MMPA is lacking in detail regarding how they are to be achieved. The definitions of the terms "conservation" and "management" in section 3(2) of the MMPA provide some guidance. These terms are meant to encompass –

> …the collection and application of biological information for the purposes of increasing and maintaining the number of animals within species and populations of marine mammals at their optimum sustainable population. Such terms include

[2] The MMPA refers to "population stocks" because it focuses management decisions and actions at the population level on what it calls "stocks."
[3] Despite the primacy of the ecosystem objective, several of the MMPA's provisions are focused on the health and status of particular species or stocks, e.g., the mandate to prepare stock assessment reports.

> the entire scope of activities that constitute a modern scientific resource program, including, but not limited to, research, census, law enforcement, and habitat acquisition and improvement. Also included within these terms, when and where appropriate, is the periodic or total protection of species or populations as well as regulated taking.

Nevertheless, as originally enacted, the MMPA did not provide more explicit direction on how these tools were to be employed or set a timeframe for achieving its goals. Rather, it relied on fairly general provisions such as: section 108, which directs the Secretary of Commerce to initiate negotiations toward international agreements for the protection and conservation of all marine mammals; section 110, which authorizes the Secretary to make research grants relevant to the protection and conservation of marine mammals; section 111, which requires the Secretary to undertake research on and develop fishing gear to reduce the taking of marine mammals; and section 112, which gives the Secretary broad tools (e.g., rulemaking and contracting authority) to carry out the purposes of the MMPA. Section 115, added in 1988, requires the preparation of a conservation plan for each species or stock designated as depleted (i.e., below its OSP) and directs the Secretary to implement those plans expeditiously. However, it does not specify a timeframe within which a stock should reach OSP or provide criteria for choosing among various tasks, many of which may be considered high priority.

Drafters of the MMPA relied on a moratorium on the taking and importation of marine mammals, subject to certain exceptions, as the primary mechanism to promote the conservation and recovery of populations. Among the exceptions are provisions allowing taking incidental to various activities. The taking regime applicable to commercial fisheries (as amended in 1994) requires preparation of assessments for all marine mammal stocks that occur in U.S. waters, calculation of each stock's potential biological removal (PBR) level, monitoring programs to estimate human-caused mortality and serious injury, and implementation of measures to reduce fisheries-related taking if PBR is exceeded.

Incidental taking in activities other than fishing is managed according to whether the level of takes would have a negligible impact on the affected stock(s) and whether only small numbers of marine mammals would be taken.[4] If the statutory requirements are met, and applicable monitoring and mitigation requirements are sufficient to ensure that the activities will have no more than a negligible impact, such authorizations should not be considered high-priority marine mammal conservation issues. Nevertheless, applicants and NMFS need to collect and analyze sufficient information to support findings that the requirements for these authorizations have been met. Although such authorizations may warrant heightened attention because they further other national priorities (e.g., locating and developing energy resources, national defense,

[4] The small numbers requirement no longer applies to military readiness activities.

facilitating commerce, etc.), the resources devoted to issuing them may detract from the agency's ability to address high priority conservation issues.

Marine mammal species and populations listed as endangered or threatened receive additional attention under the ESA. The ESA shares many features with the MMPA, including adoption of an ecosystem approach to species conservation, recognition of the need for international cooperation, and limited exceptions to otherwise applicable prohibitions on taking and importing listed species. Rather than being tied to achieving OSP, the conservation goal of the ESA is to apply "all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided [under the] Act are no longer necessary." Among the key differences between the acts are the ESA's directive to designate critical habitat, a broader mandate requiring all federal agencies to use their authorities in furtherance of the ESA's conservation goals, and a consultation requirement that places a duty on each federal agency to consult with the Secretary to ensure that the activities it authorizes, funds, or carries out are not likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat.

III. Funding for Marine Mammal Science and Conservation

Despite an increase in the range and complexity of NMFS's work over the past several years, funding for marine mammal science and management programs has not kept pace. NMFS relayed to the Commission that its budget was subject to significant cuts several years ago and that while funds to support fisheries science and management have subsequently increased, funds for protected resources have not been similarly rebuilt. Budget data provided by NMFS (Table 1 and Figure 1) clearly demonstrate that the overall ten-year trend in funding for marine mammal science and conservation is flat, while the trend for total NMFS funding is upward. The resulting budget gap is all the more alarming given the new and increasing scale of threats to marine mammals, especially anthropogenic threats. For example, the expansion in offshore energy projects – oil, gas, and renewable – has significantly expanded the workload for scientists and managers.[5] Further, additional scientific information and management measures are needed to address marine mammal conservation in a changing climate. Notwithstanding these newer issues, long-standing ones, such as bycatch of marine mammals, continue to require attention. Of particular concern is the inability to stay current on the status of marine mammal stocks: out of the 243 U.S. stocks under NMFS's jurisdiction, the information necessary to calculate potential

[5] Indicative of increasing work demands on NMFS's staff resources are the increasing complexity and environmental review associated with issuance of MMPA scientific research permits and incidental take authorizations. In addition to staff time required for review of the applications and solicitation of public comments, permits and authorizations may also require the preparation of National Environmental Policy Act documents (i.e., environmental assessments and environmental impact statements) and consultation under the Endangered Species Act before issuance.

biological removal (PBR) is available for only 152 stocks, and many of those estimates are dated.

The decline in NMFS's funding, as well as the recent government-wide hiring freeze, have had a direct impact on the ability of the agency to recruit new scientists and managers, which becomes particularly important as experienced, long-term staff retire. Furthermore, uncertainties in long-term funding often lead managers to hire temporary staff rather than permanent full-time equivalent personnel. Even if existing staff costs have been covered, the lack of funding for field work (ship time, equipment, travel, training, etc.) may hinder the ability of technical and scientific staff to accomplish what is expected, and indeed required, of them.

A number of programs demonstrate how directed funding translates into measurable progress in addressing threats to endangered marine mammals. For example, funding for field work on Hawaiian monk seals from 1980 to 2012 allowed researchers to intervene in more than 530 potentially life-threatening situations for individual monk seals, representing roughly one-third of the extant population. However, the recent decline in funding of the monk seal program has hampered the agency's ability to fully implement the monk seal recovery plan, which calls for field and laboratory work. As a consequence, fewer interventions have been possible to save reproductive females that are at immediate risk of death.

The Marine Mammal Health and Stranding Program is another example of a program that has provided a wealth of information over the past decade on the causes and severity of various threats to marine mammals, including ship strikes, fishing gear entanglements, marine debris interactions, and exposure to contaminants, pathogens, harmful algal blooms, and human-generated sound. Recent funding cuts to the Prescott Grant program have hindered the ability of NMFS and its partners in the Stranding Program to collect and collate information from stranded animals. This includes information needed to assess the efficacy of mitigation measures, such as ship speed limits to enhance North Atlantic right whale survival. Similarly, fishery observer programs provide one of the only reliable sources of information on marine mammal bycatch, including which species are being taken and the factors that contribute to, or are directly responsible for, marine mammal interactions with fishing gear. Funding for fishery observer programs continues to be inadequate for estimating, with confidence, the numbers of marine mammals that are seriously injured or killed each year incidental to commercial fishing operations.

Extent of Agency Discretion in Funding Decisions

In formulating the guidance in this document, the Commission has recognized that there are constraints on NMFS's discretion to allocate its appropriations to certain marine mammal programs and projects, even if agency staff believe that those programs and projects are of high

priority. Congressional priorities are reflected in appropriations legislation and federal agencies may not deviate from such directives without obtaining reprogramming authority. For example, appropriations directed to surveying fish stocks may not be used to conduct marine mammal conservation programs. Nevertheless, NMFS has discretion in how it apportions some of its appropriated funds. For example, a line item for protected species programs could be directed to conservation efforts for any of several different species or problems. The Commission recognizes that NMFS's appropriations are finite and that a decision to fund one program or project often means that some other activity, regardless of its importance, will not be accomplished. The guidance in this document is intended to help NMFS make the tough choices it faces in setting priorities for marine mammal programs and determining which activities are funded and at what level.

NMFS's priorities are also reflected in its formulation of annual budget requests that are submitted by the President to Congress. Although subject to certain constraints and considerable balancing, the agency has greater discretion at this stage to seek funding for high priority programs and in advocating how funds should be apportioned. It could seek additional funding for certain activities or for its marine mammal programs as a whole. The agency could also request changes in how its overall appropriations are allocated among various programs. The Commission appreciates that formulation of a budget request is a complex undertaking. Input is provided from various components within NMFS, and the request is subject to review and revision within the context of the overall NOAA, Department of Commerce, and Administration budgets. Furthermore, Congressional appropriators may not agree with the Administration's budget submission and priorities and therefore these may not be reflected in enacted legislation. These factors, however, should not deter the responsible agencies from seeking adequate funding to accomplish their missions or from systematically selecting and promoting the highest priority conservation needs in the budgets that they submit.

The Commission recognizes that NMFS needs to balance critical conservation concerns against the need to be responsive to other provisions and requirements of the MMPA. For example, NMFS must ensure that the incidental taking it authorizes under section 101(a)(5) of the MMPA has no more than a negligible impact on the affected species and stocks, and that sufficient steps are being taken to minimize adverse impacts of activities that advance other national priorities besides conservation (e.g., economic activity, energy development, national defense). To this end, NMFS needs to dedicate sufficient staff with appropriate expertise to review and issue incidental take authorizations.

NMFS must take into account public expectations regarding marine mammals that come into close contact with coastal communities. This includes responding to public concerns about increasing pinniped populations and the impacts they may be having on shoreline features (e.g., hauling out on docks, marinas, boats, and public beaches), fishing activities (e.g., "stealing"

catch from lines and nets), fish stocks (e.g., predation on farmed fish or on migrating or spawning fish concentrated at dams and in river mouths), and people (e.g., direct interactions with beachgoers, swimmers, or boaters). Similarly, NMFS is often expected to respond to high profile events, such as when marine mammals leave the ocean and travel up rivers, or strand in large numbers or in densely populated areas. The significant resources involved in responding to these types of events may not be cost-effective from a conservation standpoint, but public expectations (and in some cases, legislative mandates) to "do something" may nevertheless require NMFS or its partners to expend resources that could be better used on much higher priority needs.

IV. Themes from the NMFS Regional and HQ Meetings

As a starting point in preparing this analysis of marine mammal science and conservation priorities, the Commission held a series of public meetings between August 2012 and April 2013 in each coastal region in which NMFS operates, as well as at NMFS headquarters. At those meetings, the Commission heard about critical marine mammal program needs and priorities from agency scientists, managers, and interested citizens. The NMFS participants at these meetings recognized that the agency's internal budget formulation process dictates how they plan and prioritize their work, but noted that NMFS currently lacks a unified, nationwide approach for determining marine mammal research and management priorities. Moreover, the Commission believes, from the input it received, that decisions to undertake certain activities often seemed to be driven by unanticipated, externally driven events and processes rather than a careful weighing of conservation-based priorities by the agency. These include responses to emergencies and other catastrophic or highly visible events (e.g., oil spills, marine mammal mortality events, strandings, entanglements, petitions to list species under the ESA or designate them as depleted under the MMPA, litigation or threats of litigation, or political or public pressure). While some of the actions resulting from such occurrences may be high priority, some may not. Despite efforts to be strategic and farsighted in establishing research and conservation principles and setting funding priorities, longer-term needs often fall by the wayside as they compete for attention with shorter-term demands that crop up on a regular basis. With declining or flat budgets, NMFS acknowledged that it has the capability to focus on only a limited number of marine mammal populations and threats at any given time.

Given this context, the Commission found that the following five themes nonetheless emerged from the regional and headquarters meetings with NMFS:

(1) The value of maintaining long time series of data on marine mammal populations in order to provide timely, accurate, and cost-effective advice to managers on status and trends.

Scientists and managers at each NMFS meeting conveyed the need for sufficient resources to maintain marine mammal stock assessment capabilities, identifying abundance and trend data as "the basis for everything we do." Congress included a mandate for regular stock assessments in the MMPA based on the premise that those assessments, and the corresponding population trend information, would form the basis for virtually all management decisions made by the regulators (see Taylor et al., 2007).[6] For example, assessments are required for calculating the allowable levels of takes (PBR) for a marine mammal population affected by a commercial fishery, conducting a negligible impact determination for a seismic survey or military training activity, evaluating the population-level impact of a catastrophic event, or determining whether a marine mammal is eligible for listing under the ESA. NMFS regional offices and science centers repeatedly made the case in the regional meetings that their ability to conduct marine mammal shipboard and aerial surveys had been seriously eroded in the past five years. In addition to the decline in the share of stocks that have been adequately assessed (152 out of 243), the lack of funding has impeded the agency's ability to conduct comprehensive region-wide surveys, particularly in Alaska, the Caribbean and the Western Pacific. The risks associated with dependence on outdated (and thus less reliable) surveys and other data were also raised in the regional meetings. The Commission noted that in the Southeast region, for example, the stock assessments for only five of 89 stocks in the entire region are considered adequate, and the management challenges associated with such a scarcity of basic information are plainly evident.

(2) The fundamental need for baseline information on marine mammal populations and their ecosystems, and an ability to ascertain and assess the impacts of and risks posed by human activities such as fishing or shipping, and by environmental catastrophes.

While most NMFS regions tend to invest their efforts and resources in marine mammal populations that are of particular interest or logistically easier or less costly to observe and study, staff acknowledged problems created by the lack of baseline data on other marine mammals within their jurisdictions (e.g., those that occur offshore or in remote areas, or that are behaviorally cryptic) and on the associated ecosystems. Baseline data allow the detection, evaluation, and identification of actions needed to address threats to marine mammals such as direct and indirect fishery interactions, offshore energy development, unusual mortality events (UMEs), and catastrophic events. For example, the ability of scientists to evaluate the true

[6] Taylor, B.L.., M. Martinez, T. Gerrodette, J. Barlow, and Y.N. Hrovat. 2007. Lessons from monitoring trends in abundance of marine mammals. Marine Mammal Science, 23 (1): 157-175.

impact of the Deepwater Horizon oil spill and the pre- and post-spill unusual mortality event (UME) of bottlenose dolphins in the Gulf of Mexico has been undermined by the lack of baseline data on population size, distribution, reproductive rate and health for Gulf marine mammals. Emerging threats to marine mammals and their habitats, such as those from climate change, ocean acidification, and shifts in the marine mammal prey base, also cannot be fully assessed and understood without information on both the status and trends of marine mammal populations and on the ecosystems in which they occur.

NMFS staff at the regional meetings expressed concern about the agency's lack of resources to allow adequate observer coverage on fishing vessels, which compromises the agency's ability to assess serious injury and mortality from interactions with fishing gear (commercial and recreational). In particular, certain fisheries that are potentially significant sources of marine mammal bycatch have no observer coverage, due primarily to inadequate funding. In many fisheries, there are inadequate or no data from which to estimate bycatch of marine mammals. For example, the 2014 MMPA List of Fisheries identified 53 state and federal fisheries that had frequent (Category I) or occasional (Category II) bycatch of marine mammals. Of those, only 19 were identified in the 2013 National Bycatch Report as having any observer coverage. NMFS staff also acknowledged a serious shortfall in understanding the extent and consequences of undetected or delayed mortality and serious injury of marine mammals from interactions with fishing gear.

(3) The challenge of assessing and addressing broad threats to marine mammals and their ecosystems, such as global climate change, ocean acidification, and ensonification and contamination of habitats.

The Commission noted the concerns expressed at the regional meetings regarding the lack of data that leads to a poor understanding of some overarching threats – both direct and indirect – and the lack of infrastructure to obtain the data and address the threats. Although some progress has been made toward understanding risks to marine mammals from direct threats, such as fishery interactions and ship strikes, NMFS expressed great concern regarding the lack of information on a host of potentially serious indirect threats, including: climate change, ocean acidification, offshore energy activities, habitat loss/degradation, shifts in the marine mammal prey base, anthropogenic sound, and disease and contaminants.

NMFS officials also reported that their ability to assess and mitigate the cumulative impacts from all of these sources, which may be necessary when determining whether to issue take authorizations under the MMPA, is far beyond the agency's current science and management capacity. For example, scientists in the Northwest region drew direct connections between the recovery program for southern resident killer whales, listed as endangered in 2005, and the region's watershed ecology program, which includes expertise in chemical ecology and

toxicology and is therefore crucial for assessing the impacts of land-based pollutants (e.g., pesticides and oil) on these killer whales and their primary prey, Chinook salmon. Yet funding has declined for the watershed ecology program, impairing its capability to help the agency address killer whale issues as well as the broad spectrum of threats to the marine ecosystem from land-based pollutants. Of particular concern is that the loss of such programs compromises the ability of marine mammal scientists to detect changes in the marine ecosystem before they begin to affect humans, given the potential "sentinel" role of marine mammals as indicators of ocean health.

(4) The need to maintain and strengthen the stranding program in order to provide data on: numbers and causes of marine mammal deaths; patterns of strandings, diseases, and health of marine mammals and their ecosystems; and ship strikes, fishery interactions, and other perturbations caused by human activities.

The Commission received input at the regional meetings suggesting that there is need for expanded capacity to respond to marine mammal strandings and thereby improve disease surveillance and detection, expedite determinations of cause of death, and allow for warnings of events that pose health risks to humans and marine wildlife populations. In addition to the strong public interest in strandings, scientists and managers recognize and wish to emphasize the importance of stranding events as indicators of broader ecosystem and health concerns. The stranding program benefits from a cadre of volunteers who are trained in collecting vital data on stranded marine mammals. The Stranding Network provides an excellent example of how partnerships can leverage funding many times over, when available, to enhance NMFS's ability to meet mandates under the MMPA. It is important to bear in mind that oversight and coordination also require funding at the NMFS level, including for administration of Prescott grants.

Information collected from strandings provides insights into the effectiveness of regulatory or voluntary measures such as those meant to reduce bycatch, restrict ship speeds and direct ship traffic around, rather than through, areas of high whale density (and thus reduce ship strikes and noise disturbance). In one particular region, the value of data from strandings was underscored by pointing to an instance in 2011 when investigations of stranded animals revealed the cause of a harbor seal die-off to be a strain of bird flu with the potential to be transferred to humans. Scientists and managers believe such events signal perturbations caused by such things as shifting prey patterns and changes in prey availability, domoic acid contamination, and larger-scale oceanic oscillations (e.g., El Nino/Southern Oscillation) that can have important consequences for humans, fisheries, and coastal economies.

(5) The need to improve collaboration and achieve increased efficiencies in determining how to set priorities and address matters that cut across the activities, responsibilities, and resources of multiple agencies.

Given recent flat or declining budgets, there is growing interest in exploring the possibility of securing external assistance through partnerships, resource sharing agreements, and collaborative education/outreach programs, representing heightened leveraging of funds, infrastructure, and expertise across agencies and other entities. Examples include the U.S. Navy's provision of funding and infrastructure to NMFS scientists to undertake research addressing critical issues of common concern to both agencies, the Bureau of Ocean Energy Management's (BOEM's) funding of marine mammal research by NMFS, marine mammal research commissioned by the oil and gas industry, co-management agreements with Alaska Native Organizations, and efforts by fishermen to refine and experiment with bycatch reduction devices, in some cases in collaboration with non-governmental organizations. Long-term benefits to the industries engaged in resource extraction from the ocean (e.g., energy, fishing, and mining) derive from improved scientific data collection and analysis, which allow for more tailored and less burdensome mitigation and monitoring measures. Environmental NGOs also frequently engage in marine mammal science and management (e.g., WWF Smart Gear competition, International Fund for Animal Welfare support for field research on right whales and western gray whales). One obstacle to consider is the existing restriction on whether and how funds can be transferred between government agencies and between government agencies and private entities (e.g., industry, foundations).

V. Guiding principles used by the Marine Mammal Commission for prioritizing marine mammal science and conservation

The five guiding principles provided in this section are viewed by the Commission as the foundation for setting the broad picture of marine mammal research and conservation priorities across the federal government. These principles, which are underpinned by and mandated in the legislation described in Section II and which reflect societal values, are informed by scientific and traditional knowledge of marine mammals and ecosystems, and reflect best practices in conservation and management. Section VI identifies criteria that can be used by Congress, NMFS, and other agencies to set specific priorities for federal marine mammal programs.

Guiding Principle #1: Prevent loss of species, habitat, and ecosystem function

The MMPA requires efforts to ensure that species and population stocks are maintained as significant functioning elements of their ecosystems. Marine mammal species have gone extinct as a result of human actions (Caribbean monk seal, Japanese sea lion, baiji, and Steller's sea

cow) and, as a result, the ecosystems of which they were a part have been altered irreversibly. When populations have been extirpated (e.g., Atlantic gray whales, Gulf of St. Lawrence walruses), or species or populations have been substantially depleted (e.g., Hawaiian monk seals, North Pacific right whales, southern sea otters, southern resident killer whales, Cook Inlet belugas, vaquitas), their ability to continue as functioning elements of their ecosystems has been compromised or lost entirely. Such changes may prove to be irreversible, at least within the span of decades and perhaps centuries. Ecosystems and habitats can be altered to such an extent that they no longer provide the services that they once did, jeopardizing the viability of species and populations that depend on them. As human impacts on marine ecosystems increase, including through the effects of climate change, marine mammals become ever more threatened. Preventing marine mammal species and populations from being driven to extinction, whether absolute or ecological, and ensuring that their habitats and ecosystems are preserved intact and functioning, must always be the first priority. Successful cases of recovery of species such as Pacific gray whales and northern elephant seals, and progress toward recovery of species such as West Indian manatees (at least in Florida), Guadalupe fur seals, humpback whales, fin whales, and sperm whales, demonstrate that focused protection efforts can benefit endangered marine mammals.

Guiding Principle #2: Conserve and protect marine mammals as ecosystem components

The MMPA articulates and emphasizes a national concern regarding the potential adverse effects of human activities on marine mammal habitat and ecosystems – in essence calling for ecosystem-based management. Conservation has long been approached on a single-species or single-stock basis, despite the realization that wild organisms are integral parts of complex, integrated systems. Single-species or stock-based management is often focused on a single or very small number of factors, and therefore is a simplification of such systems that almost always overlooks or ignores significant components and processes, thereby compromising the effectiveness of such management and sometimes leading to unintended consequences. Ideally, management to conserve marine mammals should follow an ecosystem approach, which requires a thorough understanding of ecosystems, including the relationships among species, and their vulnerability and responsiveness to anthropogenic and natural stressors. Although ecosystem-based management remains, in many ways an aspirational goal, there are steps that can be taken to move away from the single-species, single-factor model toward something more holistic. For example, stock assessment models can include abiotic forcing factors, competition for common resources, multiple managed species, or links between habitat quality, human activities and species' vital rates. In addition, managers can build their approaches on the application of marine protected areas, or the guidance provided by complex ecosystem models.

Guiding Principle #3: Rigorously monitor marine mammal populations, habitats, and ecosystems

For species that occur in U.S. waters, stock assessments form the basis of most decisions made by marine mammal management agencies. Such assessments require current, reliable data on population structure, abundance, trends, distribution, and human causes of mortality. Data are collected through research activities including vessel and aerial surveys, photo-identification and genetic studies, acoustic monitoring, observer programs, and stranding networks. Although data collection can be costly, the investment is fundamental to obtaining the timely and accurate scientific information decision makers need for developing targeted, non-burdensome management measures. This information also is valuable for identifying emerging conservation issues such as abrupt population declines, epidemics, or unusual mortality events, and informs the design and implementation of remedial measures. In an era of climate change and increasing human impacts on marine resources, effective monitoring is essential to the conservation of marine mammals and their ecosystems.

Guiding Principle #4: Conserve marine mammal species and stocks whether they occur in domestic, international, or foreign waters

Marine mammals are a common, global resource and the MMPA provides tools for promoting international research and conservation. Efforts must be made to compile sufficient information on marine mammals that occur both in international waters and within the jurisdictions of other countries to assess the threats they face and to consider the options for meeting conservation needs. Unilateral conservation efforts by the United States are less likely to be effective than multilateral efforts, particularly for the many marine mammal stocks that occur exclusively outside U.S. waters, in both U.S. and foreign waters, or on the high seas. The United States has a vital role to play in facilitating worldwide conservation of marine mammals and NMFS, in conjunction with the Department of State and other agencies, has a clear mandate under the MMPA to strengthen existing international agreements and pursue additional agreements toward that end. Global conservation of marine mammals and marine ecosystems also would be strengthened by fully implementing other provisions of the MMPA directed at international threats, such as banning imports of seafood from fisheries that result in serious injury or mortality to marine mammals in excess of U.S. standards. More direct assistance to address acute threats to the most endangered marine mammals should also be pursued with urgency, in particular supporting and calling for strengthened emergency efforts to eliminate bycatch of vaquitas in fisheries in the Gulf of California, Mexico. The United States is the primary market for the target species – shrimp – in this fishery and is also a critical partner with Mexico in enforcement measures to combat the illegal trade from the totoaba fishery, which is the greatest immediate threat to the vaquita.

Guiding Principle #5: Minimize impacts of human activities on marine mammals

Sustaining healthy marine mammal populations and their ecosystems requires identifying, understanding, and managing human activities that have the potential for adverse impacts. Long-known impacts such as fishery bycatch are fairly well studied, but even there, large data gaps persist and mitigation often remains a substantial challenge. For other threats, particularly emerging, ubiquitous, or large-scale threats (e.g., anthropogenic sound, pollution, or climate change), the analyses, attribution, and implementation of mitigation measures are much more complex and impeded by scientific uncertainty. Despite the difficulties, to meet their obligations under applicable statutes, the responsible agencies need to take steps to understand these types of threats, assess the risks they pose, and design and implement corrective actions. As discussed in a subsequent section of this report, the uncertainties associated with addressing these problems demand precautionary management. Also, because many of such problems cut across agency responsibilities and expertise, they may best be addressed through cooperation and collaboration among the interested federal and state agencies, foreign governments, international organizations, and non-governmental stakeholders.

VI. Prioritization criteria

The principles set forth in the previous section provide guidance for setting long-term priorities for federal marine mammal programs. Application of these principles is critical to maintaining intact, resilient ecosystems and to achieving other federal conservation goals. However, resources are insufficient to carry out all high-priority activities simultaneously, and the principles do not readily translate into priorities at the level at which agencies execute their operational plans. In providing advice to the government, the Commission relies on the following types of criteria for assessing the importance of species, population stocks, habitats, and anthropogenic stresses, and for deciding which agency activities are the most pressing or most likely to succeed. These criteria, in addition to others such as specific legislative mandates, should be useful to the agencies as they set their marine mammal conservation and management priorities.

- ***Value***. A given species may have exceptional biological importance, such as being particularly isolated evolutionarily (e.g., the single extant member of a genus or family), or having exceptional ecological importance, such as functioning as a keystone[7] species. In addition, a species may be economically important (e.g., the focus of tourism

[7] A keystone species is a "species that has a disproportionately large impact on its environment relative to its abundance." Paine, R.T. 1995. A conversation on refining the concept of keystone species. Conservation Biology 9 (4): 962-964.

activities), or culturally and nutritionally important (e.g., subsistence species harvested by native communities).

- ***Status***. A species or stock may be a priority because it is rare, at low numbers, declining rapidly, geographically isolated, and/or designated for special conservation status under the ESA (e.g., threatened or endangered) and/or MMPA (e.g., depleted).

- ***Vulnerability***. One or more species or stocks may be priorities because they are exceptionally vulnerable to single or multiple stressors (e.g., direct and indirect impacts of fishing, ship strikes, sound disturbance, disease, pollution, habitat/ecosystem alteration, or climate change effects). Conversely, mitigating the impacts of a human activity may be a priority because it is particularly intense and/or extensive, increasing in importance, and/or a significant threat to priority or multiple species or stocks.

- ***Uncertainty***. Applying the precautionary principle, a species or stock may be a higher priority than would be indicated by the other criteria because we lack necessary knowledge of its biology or ecology, its vital demographic rates, its vulnerability to human threats, and/or its capacity to recover from impacts. Similarly, addressing a human activity or impact may be given a higher priority because we lack sufficient knowledge of its severity, extent, and/or trends. In either case, priority may increase because we lack the necessary information to identify, develop, and implement needed conservation measures.

- ***Institutional capacity***. The priority given to a specific issue may be raised or lowered somewhat, depending on a number of factors not necessarily related to the criteria listed above. For example, remedies that require few resources (e.g., funding, equipment, infrastructure, personnel) or that are likely to deliver significant benefits from a modest expenditure may be given somewhat higher priority than would be indicated by the other criteria. Similarly, issues that have strong support, including funding, within government, among stakeholders, and from the public may be given higher priority if that support increases the chance of success. Conversely, actions that lack the necessary commitment of cooperation outside the federal government (e.g., from industry, states, or foreign governments) may be given a somewhat lower priority. In some cases, these institutional factors may result in a prioritization that is inconsistent with other criteria, such as a species' ecological value or stock status.

VII. Optimizing budget and staff allocation within NMFS

Priority setting and budget formulation within NMFS could benefit from taking a more national perspective. Currently, the staff in each NMFS regional office and science center coordinate on a regular basis to establish management and science priorities. The degree of coordination varies from region to region, but for the most part, this process ensures that the science being conducted by, or contracted for, each region is responsive to management needs. However, there does not appear to be a coordinated process within NMFS for establishing national priorities, or for developing budget initiatives that reflect those priorities. As a result, there is no clear process for ensuring that budget allocations across NMFS reflect the highest overall priorities for marine mammal research and conservation.

NMFS headquarters currently oversees or conducts annual, topic-based reviews of science programs (stock assessments, protected species, etc.) of all six science centers on a rotating schedule. These reviews might be more useful if they addressed not only whether the programs within each region and center "unit" are operating in an efficient, cost-effective manner, but also whether they are meeting the agency's highest overall priorities. For example, a coordinated national approach might identify the benefits in having certain regions designated as "centers of excellence" for addressing particular science or conservation issues.

In the mid-1990's, the NMFS Office of Protected Resources allocated certain budget line items using a collaborative process that involved personnel from headquarters and each region and center. The process involved a review of ongoing projects to ensure that they were meeting stated performance objectives, as well as an evaluation of proposed projects to determine which ranked highest in addressing the agency's science and management needs. This "bottom up" approach was admittedly time-consuming and did not provide absolute certainty in the funding of multi-year projects or extend to all projects and programs in each region. However, it did establish and apply specific criteria for determining how limited funds should be allocated to meet both ongoing and emerging needs. It also encouraged intra-agency communication regarding the development and application of new technologies, scientific methods, and management approaches. A similar process could be crafted for making funding decisions regarding the allocation of current funds or for developing new budget proposals. Such a process would help ensure a greater degree of cross-agency collaboration and peer review to address the agency's highest priorities more effectively from both a regional and a national perspective.

A rigorous internal review of ongoing programs and mandates at the national level also would help ascertain whether current activities are providing tangible conservation benefits. Changes in the effectiveness of ongoing and long-term projects could result from, for example, changes in the status of the affected species or stocks, the use of outdated technologies, ineffective research methods, or unclear statutory or regulatory mandates. Internal adjustments could be made to

redirect limited agency resources or, in the case of unclear mandates, recommend legislative or regulatory changes that would facilitate more effective conservation approaches.[8]

Marine mammal scientists and managers at NMFS have recently launched a new initiative that is a step in the right direction for internal and cross-agency collaboration. Specifically, the intent is to increase funding and infrastructure for meeting protected species science needs through improved coordination and leveraging of existing resources, both within, and external to NMFS, and to increase the degree to which existing internal and external resources are used to fulfill agency science needs. The Protected Resources Science Investment and Planning Process – or PRSIPP[9] – has as its objective securing investment in science by identifying common needs and addressing them through enhanced partnerships. Although NMFS has only just begun implementing the PRSIPP, the process is already assisting NMFS staff in evaluating the need for conducting multispecies, multidisciplinary surveys in all marine ecosystems for which NMFS has marine mammal jurisdiction, on a rotating six-year cycle (each region being surveyed at least once, some twice, during a single cycle). As currently contemplated, these surveys would collect data on abundance and trends in marine mammals, biology (population structure, health and condition) and include an overall ecosystem assessment. Surveys would be conducted on NOAA ships, with leveraged funding from other federal agencies following a model that is currently successful in both the Atlantic and Pacific. By conducting these surveys at an ecosystem level and including all species, as opposed to single-stocks, NMFS can more effectively coordinate and execute the use of its limited resources.

Overall, based on the Commission's review, it appears that NMFS's management priorities and its allocation of available resources have continued to be driven largely by fishery management mandates, in particular funds spent on fish stock assessments. While there are indications that NMFS is beginning to place a higher priority on its protected species and habitat science and management programs, a corresponding shift in resource allocations to support such a shift in priorities may not be feasible given current constraints on NMFS's budget. Constraints exist even within NMFS's protected species budget, where funding is associated with specific programs, and often does not take into account the substantial financial needs associated with conducting marine mammal stock assessments, as well as addressing other basic science needs. Although the programs identified for funding by Congress must be addressed as priorities, whether they represent the most strategic priorities for effective conservation of NMFS's trust resources remains unclear in the absence of a more robust and deliberative process for evaluating priorities.

[8] For example, NMFS reviews permit applications for educational or commercial photography activities that have the potential to disturb marine mammals in the wild to ensure that those activities will not injure marine mammals (MMPA section 104(c)(6)). However, members of the public regularly engage in similar activities without any such review or authorization. If the goal is to prevent unauthorized harassment of marine mammals that might have adverse population-level effects, NMFS might achieve greater conservation benefit by developing enforceable guidance specifying what constitutes harassment under the statutory definition. NMFS could then focus on public outreach, compliance monitoring, and enforcement to prevent harassment of those species and stocks of greatest concern.

[9] For additional information about the PRSIPP, the PRSIPP Tech Memo can be found here: http://spo.nmfs.noaa.gov/tm/TM140.pdf.

VIII. Priorities

By applying the principles and criteria summarized above, and using a regular and deliberative national approach, it should be possible for NMFS to identify and prioritize the many tasks that the agency is obliged to undertake as it seeks to implement the MMPA and its ESA mandates related to marine mammals. Identifying the full spectrum of activities that might be undertaken by NMFS, and ranking each against the others, is beyond the scope of this report. However, the Commission believes that it is useful to illustrate how the application of these principles and criteria can lead to a list of priorities, as noted below.

Increasing Greenhouse Gases

(1) Climate change, including changes in ocean temperature, changes in sea ice, and introduction of diseases to regions and species not previously exposed.

(2) Ocean acidification, including lower trophic-level impacts affecting the entire food web.

Addressing climate change and ocean acidification is essential for achieving the MMPA's primary goal of maintaining the health of marine ecosystems. Both of these priorities are based on multiple guiding principles (particularly #2, #3, and #5) referring to the challenges of monitoring and understanding marine mammals and their ecosystems, and addressing human activities that are directly or indirectly related to climate change. They also reflect multiple criteria, such as the vulnerability of certain marine mammal species and the uncertainties associated with understanding and assessing the impacts of climate change and ocean acidification. While these overwhelming issues are beyond the scope of the MMPA and the capacity of NMFS, the drivers and impacts of climate change and ocean acidification must be addressed. The potential scope of the work required to address these drives and impacts is nearly limitless, so NMFS should focus on regions where climate change impacts are most immediate or extreme, and where these changes are likely to affect marine mammal populations that are depleted, vulnerable, or of uncertain conservation status (e.g., the Arctic).

Species and Populations of Special Concern

(3) North Pacific right whale: a species depleted by whaling that still hovers at the brink of extinction.

(4) Hawaiian monk seal: a declining trend with different threats at different locations, needing sufficient funding for the scientific and conservation program outlined in the species' Recovery Plan.

(5) Vaquita: an accelerating decline toward extinction with strong political, enforcement, and scientific intervention required to spur Mexico to take immediate measures to eliminate vaquita bycatch through emergency closure of the entire vaquita range to all gillnets, concerted enforcement, and continued population monitoring.

(6) Cook Inlet beluga whales: a small stock in decline for unknown reasons, and in need of concerted research and mitigation efforts that would be expected to lead to a reversal of this trend.

(7) North Atlantic right whale: a species severely depleted by whaling that although slowly increasing, still needs better protection from bycatch and ship strikes.

The following three species - North Pacific right whale, Hawaiian monk seal, and vaquita - and the population of beluga whales in Cook Inlet are endangered, at very low numbers, and likely to continue declining. The vaquita is now on the verge of extinction. Guiding principle #1 and the criterion addressing status of populations underscore the importance of addressing such situations. For the vaquita, guiding principles #4 and #5 refer to the need to act internationally and address the bycatch threat – in this case, bycatch in fisheries whose production is sold largely on the U.S. market. For Cook Inlet belugas, after an initial decline from overhunting, there has been no sign of recovery and considerable uncertainty surrounds the question of what is causing the population's continuing decline (see the Uncertainty criterion, above). For the North Pacific right whale, there is uncertainty regarding range and movements and regarding threats that may be impeding recovery. Some of that uncertainty could be addressed through scientific studies such as satellite tagging and passive acoustic monitoring. While there has been progress in addressing the threat of ship strikes on North Atlantic right whales, there is continuing concern about entanglement in fishing gear. Two of three confirmed right whale deaths in 2012 were from entanglement and six other whales were observed to be entangled or with entanglement injuries for the first time.

Fisheries Impacts

(8) Bycatch and depletion of marine mammal prey: prioritize the need for assessment and mitigation of direct and indirect interactions with fisheries. Bycatch (and entanglement in derelict fishing gear or other debris) impacts marine mammals directly through injury and mortality, and certain directed fisheries target species that are marine mammal prey, potentially leading to decreased food availability.

(9) Address marine mammal conservation through trade where U.S. market demand is driving direct impacts on marine mammals (especially bycatch) in other countries. Strong trade measures – not just warnings – could help ensure that U.S. consumption is not contributing to declines in marine mammal populations.

Fishing remains the greatest immediate global threat to marine mammals, particularly through bycatch. Guiding principles #3 and #5 call for effective monitoring and mitigation of bycatch through observer programs and the implementation of bycatch reduction measures. While there has been substantial progress in addressing these issues in most domestic fisheries, measures applied to many foreign fisheries continue to lag behind the U.S. measures (guiding principle #4), even when the products from those fisheries are sold on the U.S. market. The criteria provided above stress the importance of addressing fishery-interaction issues for marine mammals that are endangered, in decline, and particularly vulnerable to threats from fisheries. In many cases, there is enough uncertainty to raise the priority level of monitoring and observing as necessary components of addressing fishery issues.

Assessment of Status and Trends

(10) Marine mammal stock assessment surveys: prioritize the assessment of marine mammal stocks, e.g., starting with cases for which there are known or suspected threats, and then focusing on stocks with outdated, little, or no previous abundance and trend data – recognizing and addressing the challenges and expense of assessing offshore stocks, cryptic species, or those in remote (Arctic, Pacific Islands) areas. (See Section X) addressing the need for greater support from public and private partners).

(11) Marine Mammal Health and Stranding Program: improve response to strandings and expand the use of stranding databases, in order to better understand the causes and implications of marine mammal strandings.

Guiding principle #3 underscores the importance of monitoring marine mammals, including the preparation of regular stock assessments and the collection of data from strandings to allow for appropriate analyses. The above criteria call for particular attention to be given to marine mammals whose conservation status is uncertain, and whose vulnerability to various human threats can be better assessed and understood by analyzing strandings (e.g., North Atlantic right whales, Southwest Atlantic population of southern right whales, and Gulf of Mexico bottlenose dolphins).

Impacts of Offshore Energy Development

(12) Monitoring studies to detect changes in marine mammal distribution, abundance, and health in the Arctic and other areas subject to offshore energy development.

Guiding principles #3 and #5 call for effective monitoring and mitigation of human activities that have known or potential impacts on marine mammals. Offshore energy development raises concerns about sound, oil spills, and increased vessel activity. Addressing these risks should be emphasized particularly for species that are endangered, threatened, or in decline, are particularly vulnerable to certain types of human-generated sound, or for which there is uncertainty regarding the impact of the sound. There are many lessons still to be learned from the Gulf of Mexico Deepwater Horizon oil spill, but it is clear that the baseline information needed for damage assessment was not marshaled in advance and that technologies to prevent and respond to an oil spill have not kept pace with drilling technologies. Additionally, the Arctic has many unique features in terms of both human cultures and wildlife richness. As such, its protection is a special responsibility that brings new challenges to both government and industry. It is a responsibility and a challenge to ensure that the impacts of offshore energy development on marine mammals and the Native communities that depend on them for subsistence are rigorously monitored and minimized, with industry contributing to the efforts, if necessary, as a condition of receiving authorizations or permits.

IX. Conservation activities in the context of limited scientific knowledge

Despite some advances in scientific information on marine mammals, inadequate funding leads to continued scientific uncertainty and delays in the ability of NMFS to evaluate and identify appropriate conditions for authorizing marine mammal "takes" for various commercial and research activities. Importantly, NMFS also faces a heightened risk of litigation if it issues authorizations in the face of such uncertainty.

The precautionary principle requires that conservation decisions incorporate consideration of the risk and uncertainty associated with activities that have the potential to adversely affect marine mammals. Insufficient scientific data and analyses can lead to overly restrictive mitigation requirements for commercial and national defense activities, such as fishing, offshore energy development, shipping, seismic surveys, and military operations. Additionally, limited federal personnel and funding will likely delay the issuance of permits.

The precautionary principle is often invoked when the management agency is unable or unwilling to invest the resources needed to reduce uncertainty. This circumstance can cause activities to be delayed and/or curtailed to a greater extent than would be necessary if more were known about the affected marine mammals and the impacts of such activities on their health and

that of the ecosystem. One of the most obvious examples is when survey data and other information are inadequate to assess marine mammal stocks and calculate PBR. With no PBR, or with large uncertainty surrounding values used in the PBR calculation, the precautionary principle requires relatively restrictive measures to address fishery interactions, whether direct (bycatch) or indirect (predator-prey relationship).

X. Interagency and public/private collaborations

At present, the responsibility for managing risks to marine mammals falls heavily on NMFS, which lacks the resources necessary for adequate risk assessment and response. Having other federal action agencies assume greater responsibility and provide greater support for characterizing and managing the risks of the activities they oversee, authorize, or conduct (e.g. offshore energy development, military operations) is the best way to leverage NMFS's limited resources.

In the regional meetings, NMFS acknowledged the need for external assistance and collaboration to assess stocks and characterize risks. Participants cited examples such as contributions to NMFS by the Navy and the Bureau of Ocean Energy Management (BOEM) to fund the Atlantic Marine Assessment Program for Protected Species (AMAPPS); engagement by fishermen and harbormasters to develop and implement effective non-lethal means to deter marine mammals from fishing gear and marinas; enhanced sharing of data among federal agencies to assess threats from various sound-producing activities (the focus of NOAA's Cetacean and Sound Mapping Project); and assistance from the academic community to uncover the potential implications of climate change and ocean acidification for ecosystems and marine life. NMFS also noted the benefits that could be realized from industry support for ecosystem studies or the maintenance of long-term datasets on stock abundance and bycatch. However, the agency noted limitations on its ability to receive external funds, except in a few specific circumstances.

The Commission believes it is essential that industries benefiting from the use of marine resources play a greater role in the characterization of ecosystems, collection of baseline data, and design and testing of mitigation measures to increase the effectiveness of marine mammal and ecosystem conservation. This concept was also raised by NMFS staff in the regional and headquarters meetings (theme 5 above). Fishing and offshore energy development are prime examples of activities that are socially and economically important but that also pose considerable risks to marine mammals and ecosystems. Numerous industries have supported data collection and risk assessment, but in the Commission's view all of the relevant industries need to do more. For example, resource users could be asked to provide support for ecosystem studies as a condition of their permits. Examples of commercial industries' efforts to address impacts on marine mammals include the Joint Industry Program (JIP), funded by a group of oil companies

that has supported studies of the potential impacts of offshore development activities on marine mammals. In another example from the fisheries sector, the International Seafood Sustainability Foundation, a global coalition of leading scientists, the tuna industry, and WWF, has made a commitment to science-based initiatives for the long-term conservation and sustainable use of tuna stocks, reducing bycatch, and promoting ecosystem health. Among other things, ISSF has funded research, workshops with skippers, the development of best practice guidelines to reduce bycatch, and provided tuna purchase data (species, size, vessel, and trip date information) to multilateral scientific bodies. Both of these examples, JIP and ISSF, demonstrate that industry-sponsored initiatives can enhance data collection and analysis, thereby contributing to baseline knowledge, to understanding of cause-and-effect relationships, and to improved mitigation of risks to marine mammals and their ecosystems.

Federal agencies conducting or authorizing activities that can impact marine mammals (e.g., the Navy, the National Science Foundation, and BOEM) can assume responsibility and provide support for characterizing and managing the risks that they themselves pose to the marine environment. Over the past decade, the Navy has conducted several studies of the potential effects of its sound-producing technologies. For example, studies conducted on the Navy's training and testing ranges are providing considerable insight into the responses of various marine mammal species to sonar and sonar-like sounds. BOEM (and its predecessor, the Minerals Management Service) has a long history of supporting marine environmental studies, such as those investigating sperm whale sensitivity to impulsive sounds from airguns in the Gulf of Mexico.

Efforts to date illustrate the benefits that can accrue when federal action agencies assume at least some responsibility for studying and managing the effects of their activities. Nonetheless, as with marine industries, much more needs to be done. As noted in the regional meetings, it may be necessary to develop mechanisms for encouraging or requiring greater conservation support from federal agencies active in the marine environment, and a means for transferring such financial support. In some cases, it may be necessary to consider legislative amendments that would allow easier transfers of funds and sharing of resources (e.g., ship time) across federal agencies, and from private sources to public agencies.

XI. Concluding thoughts

The guiding principles, criteria, and priorities set out in this report are intended to provide guidance for NMFS, Congress, and others involved in funding decisions in order to support a systematic, long-term approach to meeting marine mammal science and conservation mandates in the face of budgets that will likely never provide all the resources needed for all marine mammal programs. The Commission maintains that the funding shortages for marine mammal

science and stewardship will continue to severely limit NMFS's ability to meet its mandates under the MMPA (and ESA). In addition, opportunities to benefit from partnerships across federal agencies and with the private sector will continue to be limited unless regulatory or legislative changes are implemented to facilitate the sharing of funding, data, and other resources. Nonetheless, establishing a process for setting priorities of the agency will ensure that progress is made on long-term responsibilities for marine mammal science and conservation while also addressing the unanticipated short-term crises that arise.

Table 1

NMFS Budget Trends, 2004-2014

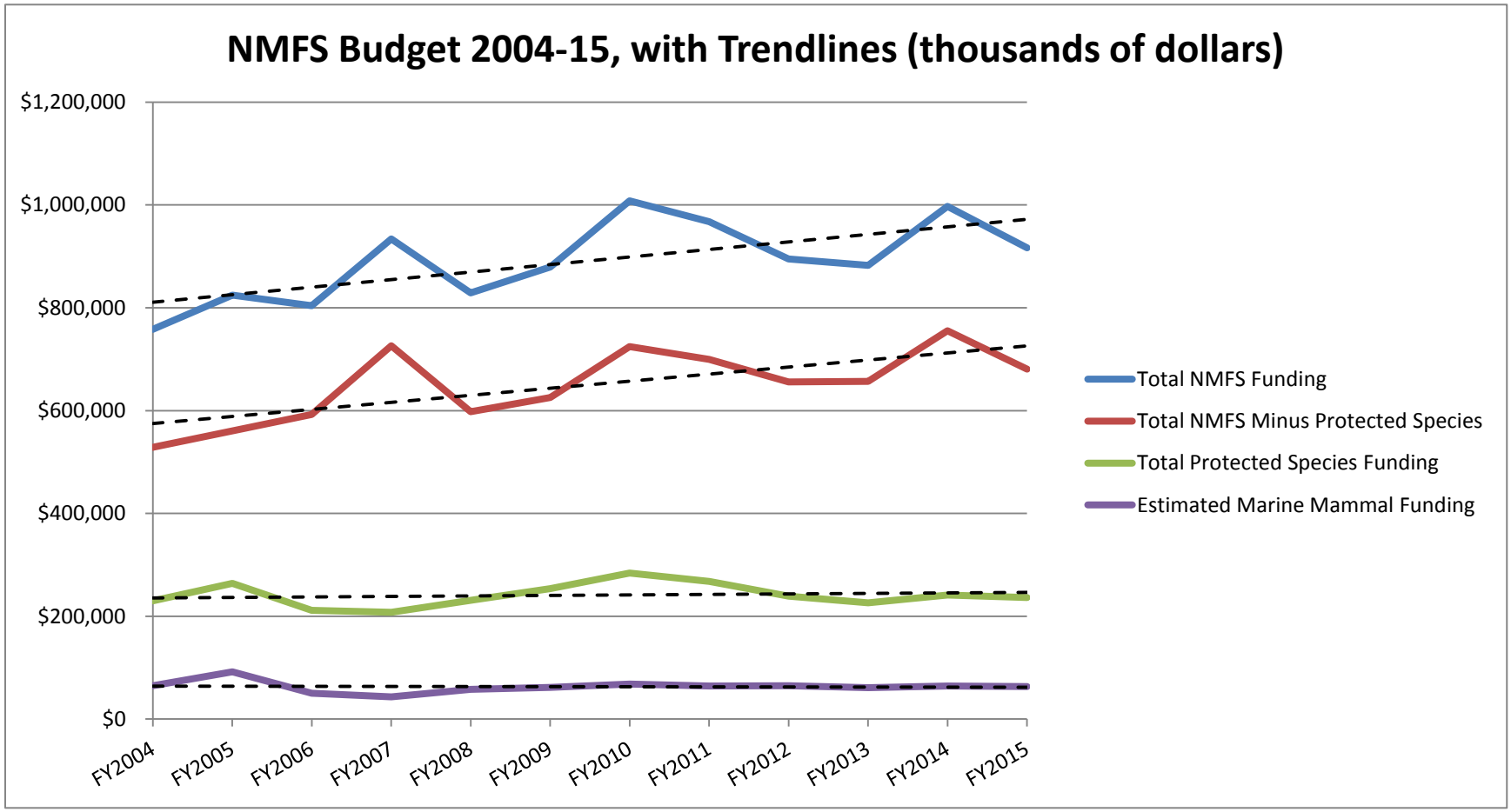
The table below (in $1000s) shows total NMFS funding, total Protected Species funding (including Pacific Coastal Salmon Recovery Fund), and the estimated total Marine Mammal funding. The estimated total Marine Mammal funding includes resources from the Marine Mammal PPA and 40% of the total funding in the Protected Resources Research and Management PPA. *Data provided by NMFS*.

	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
	Enacted	Enacted	Enacted	Spend Plan	Enacted	Enacted	Enacted	Spend Plan	Spend Plan	Spend Plan	Spend Plan	President's Request
Total NMFS Funding (ORF, PAC, Other Accounts)	$758,093	$824,295	$803,820	$933,929	$829,083	$879,447	$1,008,181	$967,497	$895,004	$882,492	$996,988	$916,751
Total Protected Species Funding*	$229,718	$263,746	$211,610	$207,586	$230,992	$253,945	$283,952	$267,941	$239,159	$225,903	$241,425	$236,211
Estimated Protected Species Marine Mammal Funding	$64,812	$92,011	$50,508	$43,441	$58,115	$61,610	$67,968	$64,071	$64,893	$61,303	$64,499	$63,089

*Includes Pacific Coastal Salmon Recovery Fund.

NOTE: The total funding for Marine Mammals is an estimate and does not include Species Recovery Grant awards, which may have also included grants for marine mammal recovery.

Figure 1



Source: Data from NMFS, as shown in Table 1.