



MARINE MAMMAL COMMISSION

5 March 2012

Mark Shaffer, Ph.D.
Office of the Science Advisor
U.S. Fish and Wildlife Service
4401 N. Fairfax Drive, Suite 222
Arlington, VA 22203

Attn: National Fish, Wildlife, and Plants Climate Adaptation Strategy

Dear Dr. Shaffer:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the draft National Fish, Wildlife, and Plants Climate Adaptation Strategy announced in the *Federal Register* on 20 January 2012 (77 Fed. Reg. 2996). The Commission appreciates the work of the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and Association of Fish and Wildlife Agencies in developing this draft and believes that it contains the core of a first-generation national climate adaptation strategy.

RECOMMENDATIONS

The Marine Mammal Commission recommends that the 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, in many respects (e.g., pace), unlike periods of change in the historical or geological past;
- 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;
- to inform readers regarding the many types of barriers or obstacles there are to adaptation, as well as the potential for adverse effects as species attempt to adapt;
- to include a biologically and ecologically realistic appraisal of our ability to influence or affect the resilience of wildlife populations or ecosystems;
- to provide a realistic appraisal of our 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;
- to provide a realistic appraisal of our current and future ability to recover species and restore ecosystems depleted or degraded by climate disruption;
- to include a strong call for the research needed to characterize and manage cumulative effects, and the resources needed to support that research;
- to include in its purpose and vision statements an emphasis on the need for innovation, since such innovation will be essential for addressing shortcomings in our current approach for managing the effects of climate disruption; and

- to incorporate more of the relevant scientific literature on the topic of organism or ecosystem adaptation to climate change.

RATIONALE

The Commission concurs with much of the draft strategy's characterization of climate change. However, the Commission prefers the term "climate disruption" and will use it because the Commission considers this term to be more accurate: human activities are not merely changing the climate, they are disrupting the earth's natural climate processes. Indeed, climate disruption is having, and increasingly will have, profound effects on natural and human systems. The future of marine ecosystems and resources, and the services they provide, will depend, in part, on the willingness of nations to (1) address the root causes of climate disruption and (2) promote adaptation to the changes that have occurred, are occurring now, or can no longer be prevented in the future. Thus, the United States and other nations must develop a climate adaptation strategy. The choices we make now will have substantial influence on whether, and to what extent, humans and other species can, in fact, adapt to climate disruption.

Climate disruption is producing continuous change in natural systems and making us more aware of the non-linear nature of certain ecological processes. We now have a whole new terminology to describe some of those dynamics (e.g., regime shifts, tipping points). Because of these changes, the past will be less useful for predicting the future. We can reasonably expect ecological changes that are more sudden, more severe, and more difficult to anticipate. We are now, and increasingly will be, operating with greater uncertainty about the scale, direction, and magnitude of ecological change. Traditional approaches to management are likely to become less effective over time because of these changes.

The potentially severe effects of climate disruption on natural and human systems demand that we respond immediately, both by addressing root causes and by promoting adaptation to the extent possible. We must develop new and innovative approaches and become much better at anticipating change than in the past, and expand our capacity to manage the cumulative effects of climate disruption and other human-related threats to natural ecosystems. All of this will require enhanced governance, resources, collaboration, and public support.

The Commission believes the draft climate adaptation strategy should be strengthened and made more realistic with the following changes.

Clarify the causes of climate disruption

The introduction and section 1.2.1 of the draft strategy document could leave the reader with an inaccurate impression that climate disruption is part of, or similar to, natural climate shifts and not a consequence of human actions. In fact, increased greenhouse gas emissions by human activities are the primary factor disrupting the climate. Therefore, the Marine Mammal Commission recommends that the 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, in many respects (e.g., pace), unlike periods of change in the historical or geological past.

Describe the adaptive capacity of humans versus other species

Section 1.2.4 cites the Intergovernmental Panel on Climate Change definition of adaptation as an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.” Humans likely will have far greater capacity to adapt than many wild organisms because of our mobility, technology, and ability to envisage and prepare for changes. Human adaptation may come with high costs, but we are an extraordinarily adaptable species, as is evident by our wide distribution. Wild populations of fauna and flora, on the other hand, will vary in their ability to adapt because of their requirement for certain habitat types and ecological niches, immobility (some species), and limited cognitive abilities. It is not clear that wildlife populations will be able to adapt as we might wish or rationalize, particularly in light of the remarkable pace of change. In a rapidly changing environment, the forces of selection on wild populations may simply be too great or too fast for some—perhaps many—species to persist.

The Marine Mammal Commission recommends that the Fish and Wildlife Service and co-drafters revise the draft climate adaptation strategy 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. Such an assessment is essential to ensure that decision-makers are well informed about the risks associated with a climate policy dependent on adaptation.

Recognize that there are limitations to adaptation

A commonly reported ecological response to climate disruption is a range shift to cooler areas (higher latitude, up in elevation, or down in depth). The strategy document discusses the pattern at length on page 24, but does not give due attention to two critical aspects of the phenomenon. First, some species may not have new ranges to inhabit. For example, ice-dependent seals will lose their habitat as the Arctic becomes ice-free. For marine mammal species occupying the northern Gulf of Mexico and the northern Gulf of California (specifically the critically endangered vaquita), the North American continent may prevent any range shift northward. The same is true for other types of species. In many locations coral reef species may be able to shift away from the tropics as it warms, but in areas such as the Northwestern Hawaiian Islands, there may be no new habitat to colonize. Second, a species attempting to shift its range may experience detrimental as well as beneficial consequences. Such a species may encounter new diseases, parasites, or predators, or may be unable to find sufficient prey. Those species also may carry pathogens and parasites to regions where they did not occur before. Therefore, the Marine Mammal Commission recommends that the Fish and Wildlife Service and co-drafters modify the draft climate adaptation strategy to inform readers regarding the many types of barriers or obstacles there are to adaptation, as well as the potential for adverse effects as species attempt to adapt.

Define resilience and our ability to affect it, particularly for natural ecosystems

Section 1.2.4 also defines resilience as “the ability of a system to recover from a disturbance, returning to its original state.” Here, at least two key questions need to be addressed. The first is whether and to what extent we understand and can influence or affect the resilience of organisms or ecosystems to climate disruption. The second pertains to the question of whether we should

reasonably expect ecosystems to maintain their fundamental characteristics in the face of the directional change being caused by climate disruption. How can we hope to increase the resilience of polar bears that are losing sea ice as a platform for hunting and reproduction, or monk seals that will lose their access to islets and atolls in the Northwestern Hawaiian Islands where they rest, molt, and give birth to and rear their young because these islets are becoming submerged by rising sea levels? Here, too, the Commission is concerned that policy makers may be using the term “resilience” without a well-informed understanding of our capacity to affect it. Therefore, the Marine Mammal Commission recommends that the Fish and Wildlife Service and co-drafters modify the draft climate adaptation strategy to include a biologically and ecologically realistic appraisal of our ability to influence or affect the resilience of wildlife populations or ecosystems.

Describe realistically our ability to protect habitat

Habitat protection is a fundamental principle of species conservation and was included as the first goal of the climate adaptation strategy. However, climate disruption is and will continue to alter habitat in ways that we will not be able to control. For example, we are not now, and will not become, capable of managing the physical or chemical changes occurring in Arctic sea ice, increasing ocean acidification, increasing variability and severity of storms, sea level rise, droughts, or changes in atmospheric or oceanic temperature. Similarly, we do not and, in most cases, will not be able to manage assemblages of species we refer to as biological communities (e.g., predators, prey, pathogens, parasites) as they change in response to climate disruption. For the most part, the trend in both terrestrial and marine ecosystems is loss or degradation of habitat. So although the notion that we will manage the effects of climate disruption by protecting habitat may have potential in some cases, it is questionable or simply unrealistic in many, and probably most, others. Here, again, the Marine Mammal Commission recommends that the Fish and Wildlife Service and co-drafters modify the draft climate adaptation strategy to provide a realistic appraisal of our 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.

Describe realistically our ability to recover species and restore ecosystems

Strategy 1.3 in Section 3 calls for the restoration of “habitat features where necessary and practicable to maintain ecosystem function and processes and resiliency to climate change.” Although the Commission agrees with the call for restoration, it also believes that the document needs to be realistic about our capacity to enable species to recover or restore ecosystems once altered by climate disruption. Here, too, we know of no practicable means of enabling polar bears, walrus, or ringed seals to recover if their ice habitat is lost. We also know of no practicable way to restore current patterns in ice-associated productivity once that ice no longer exists. Wildlife managers have long recognized that, for the most part, they manage human activities to limit their impact on wildlife, rather than managing wildlife itself. This is certainly true of marine species and the Commission expects that similar limitations apply to terrestrial species. If that is the case, then this document should be clear about the real utility of restoration projects. To that end, the Marine Mammal Commission recommends that the Fish and Wildlife Service and its co-drafters modify the draft climate adaptation strategy to provide a realistic appraisal of our current and future ability to recover species and restore ecosystems depleted or degraded by climate disruption.

Emphasize the importance and difficulty of managing cumulative effects

The effects of existing environmental stressors (e.g., overfishing, coastal habitat degradation) may be exacerbated by climate disruption, or vice versa. The strategy document would be improved by adding examples of such interactions (e.g., warmer temperatures plus increased runoff and nutrient pollution leading to more harmful algal blooms, or increased storm intensity plus sea-level rise causing degradation of coastal barrier habitat). In the Arctic, climate disruption is promoting new risk factors (e.g., commercial shipping) or increasing risk factors that previously have been at relatively low levels (e.g., oil and gas development). Although the idea of cumulative effects may be conceptually straightforward, assessing and managing those effects is still a challenge because it requires extensive data and well-designed and directed studies. Doing so is necessary because the status of any species is a function of its ability to persist despite the adverse effects of all risk factors combined. Therefore, the Marine Mammal Commission recommends that the Fish and Wildlife Service and its co-drafters revise the draft climate adaptation strategy to include a strong call for the research needed to characterize and manage cumulative effects, and the resources needed to support that research.

Emphasize the need for innovation

Although the concepts of adaptation and resilience are not new to science and management, the extent to which our climate policy appears to depend on them is. How scientists and managers will go about implementing those concepts is not clear. Traditional management approaches may still be of considerable value, but also are likely to fall short in many important respects. At multiple points, the draft rightly emphasizes the need to develop and implement new and innovative management approaches. The Marine Mammal Commission recommends that the Fish and Wildlife Service and its co-drafters modify the draft climate adaptation strategy to include in its purpose and vision statements an emphasis on the need for innovation, since such innovation will be essential for addressing shortcomings in our current approach for managing the effects of climate disruption.

Include more of the best available scientific literature

Although the strategy document relies heavily on government references, the drafters do not appear to have taken full advantage of the available scientific literature on the topic of adaptation. For example, a 2008 paper by Jonathan Mawdsley and others in *Conservation Biology—A Review of Climate-Change Adaptation Strategies for Wildlife Management and Biodiversity Conservation*—is not cited in the draft strategy document. This publication reviews strategies from the literature that are not referenced in the draft (e.g., translocation of endangered species, designing protected areas to maximize resilience). The draft also did not cite the 2010 *Conservation Biology* paper by Lee Hannah—*A Global Conservation System for Climate-Change Adaptation*—which elaborates on the strategic importance of networks of protected areas to enhance climate adaptation. Therefore, the Marine Mammal Commission recommends that the Fish and Wildlife Service and its co-drafters modify the draft climate adaptation strategy to incorporate more of the relevant scientific literature on the topic of organism or ecosystem adaptation to climate change.

Mr. P. Michael Payne
21 February 2012
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Please contact me if you wish to discuss the Commission's recommendations and rationale.

Sincerely,

A handwritten signature in blue ink that reads "Timothy J. Ragen". The signature is written in a cursive style with a long horizontal stroke at the beginning.

Timothy J. Ragen, Ph.D.
Executive Director