



# MARINE MAMMAL COMMISSION

2 July 2012

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Gulf of Mexico Outer Continental Shelf Region  
Bureau of Ocean Energy Management  
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Dear Mr. Goecke:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed (1) the Bureau of Ocean Energy Management's Draft Programmatic Environmental Impact Statement on Geological and Geophysical Exploration of the Atlantic Outer Continental Shelf and (2) the associated 30 March 2012 notice (77 Fed. Reg. 19321) seeking comments. The Commission provides the following recommendations and rationale.

## RECOMMENDATIONS

The Marine Mammal Commission recommends that the Bureau of Ocean Energy Management—

- select alternative B as its preferred alternative;
- 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;
- 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;
- 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;
- provide confidence limits and sources of potential bias associated with the density and take estimates that were calculated for each species;

- use the 120-dB re 1  $\mu$ Pa 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;
- 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;
- 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; such approval should also stipulate minimum requirements for mitigation, monitoring, and reporting, as outlined in Appendix C of the draft document;
- 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;
- develop comprehensive, standardized monitoring protocols for assessing the effects of geological and geophysical surveys and associated activities on marine mammals;
- prepare annual summaries of marine mammal observer reports, including an analysis of the frequency and outcome of all marine mammal-vessel interactions;
- 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 (e.g., a fresh dead carcass is found); and
- 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.

### **Analysis of alternatives**

The draft programmatic environmental impact statement evaluates the potential environmental impacts of geological and geophysical surveys in state and federal waters of the South and Mid-Atlantic planning areas of the outer continental shelf and adjacent high seas out to 350 nmi (648 km). The surveys would support oil and gas, renewable energy, and marine minerals exploration and development from 2012 to 2020.

The statement evaluates two action alternatives. Both include mitigation and monitoring measures to avoid, reduce, or minimize impacts on protected species, including marine mammals. They include—

- 1) time-area restrictions on airgun surveys within the Mid-Atlantic and Southeast Seasonal Management Areas designated under 50 CFR 224.105 when vessel speeds are restricted
- 2) (1 November to 1 April for the mid-Atlantic and 15 November to 15 April for the southeast);
- 3) ramp-up, start-up, and shut-down procedures for seismic airgun surveys and at least two protected species observers on duty at all times to monitor the exclusion zone, the radius of which would be determined on a survey-specific basis but in any case would not be less than 500 m;
- 4) no initiation of ramp-up at night or in poor visibility conditions if the minimum source level drops below 160 dB re 1  $\mu$ Pa-m (rms); maintaining a minimum source level of 160 dB re 1  $\mu$ Pa-m (rms) to avoid visual clearance of the exclusion zone prior to ramp-up would only be authorized under certain situations (e.g., turning, airgun maintenance);
- 5) start-up and shut-down procedures for acoustic sources used in high resolution geophysical surveys operating at a frequency less than 200 kHz and the use of at least one protected species observer on duty at all times to monitor a minimum 200-m exclusion zone (larger exclusion zones may be established where necessary);
- 6) the optional use of passive acoustic monitoring to detect vocalizing marine mammals;
- 7) training of observers in statutory and regulatory requirements, protected species identification, data collection, and reporting of marine mammals in the exclusion zone;
- 8) guidance to vessel operators on vessel strike avoidance, marine debris awareness, and prevention of discharges into the marine environment;
- 9) reporting and protection of suspected historic and prehistoric archaeological resources;
- 10) avoidance of sensitive benthic communities;
- 11) minimizing impacts on National Marine Sanctuary resources and users; and
- 12) coordination of all permitted activities with activities of the military and the National Aeronautics and Space Administration.

### **Alternative B**

Alternative B would provide more protection for marine mammals. In addition to the above, alternative B would (1) expand the time-area restrictions for airgun surveys to include all coastal waters from Cape Canaveral to Delaware Bay out to 20 nmi offshore, (2) add a sea turtle time-area restriction for airgun surveys in waters offshore Brevard County, Florida, during the nesting season, (3) require seismic operators to use passive acoustic monitoring for all seismic airgun surveys, and (4) maintain a minimum of 40-km between vessels that are conducting simultaneous deep penetration seismic surveys.

The continuous time-area restrictions along the east coast would protect breeding and migrating right whales as well as other cetaceans in near-coastal waters (e.g., bottlenose dolphins, common dolphins, white-sided dolphins, spotted dolphins, harbor porpoise, and humpback whales). However, the Commission believes that the proposed corridor is too narrow and should be expanded from 37 km (20 nmi) to 55 km (30 nmi) offshore. Prior to issuing its 2008 regulations to reduce whale-vessel collisions (73 Fed. Reg. 60173), the National Marine Fisheries Service had proposed a protective corridor out to 55.6 km (71 Fed. Reg. 36299). The width of the area was reduced based on potential economic impacts on shipping, even though it reduced protection for

right whales. Since then, Schick et al. (2009) have confirmed that migrating right whales occur at least 55 km and as far as 200 km offshore in the mid-Atlantic. Hence, in the Commission's view, the area that would be restricted under alternative B likely would not provide adequate protection for migrating whales.

The 40-km spacing requirement for vessels conducting simultaneous deep penetration airgun surveys is intended to prevent the merger of two ensonified areas to create a single, much larger obstacle to migration. The use of passive acoustic monitoring would provide additional assurance that marine mammals in the area would be detected and shut-down procedures implemented as appropriate. It also would provide a more accurate estimate of the number of animals exposed to airgun noise. This technology already is required for certain seismic surveys in the Gulf of Mexico and the Arctic, and recent advances have improved its use for detecting, classifying, and localizing marine mammals using open-source software (e.g., PAMGUARD). The Commission has commented often on the limited effectiveness of visual observations and believes that passive acoustic monitoring should be used during all surveys with active sound sources that may take marine mammals, including high resolution geophysical surveys.

Because it provides greater protection for marine mammals, including the highly endangered North Atlantic right whale, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management select alternative B as its preferred alternative. The Commission further recommends that the Bureau 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 Bureau has stated that the additional mitigation measures proposed under alternative B would add direct and indirect economic costs to the industry, and that the Bureau wishes to review the totality of the record generated by the programmatic environmental impact statement in the public review period to assist in identifying its preferred alternative. However, the information the Bureau is reviewing is not clear because it did not describe the direct and indirect economic costs associated with each alternative. The omission of economic information is inconsistent with the Bureau's regulations implementing the National Environmental Policy Act, which state that the preferred alternative is the alternative the Bureau believes would "best accomplish the purpose and need of the proposed action while fulfilling its statutory mission and responsibilities, giving consideration to *economic*, environmental, technical, and other factors" (emphasis added) (43 CFR § 46.420). The Marine Mammal Commission therefore recommends that the Bureau of Ocean Energy Management 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.

## **Reducing the potential for redundant seismic surveys**

At least 38 marine mammal species occur in the North Atlantic during all or part of the year (Waring et al. 2011). The area of interest for the proposed surveys includes a wide range of marine mammal habitats. The surveys would involve the use of seismic airguns that emit high energy, low frequency acoustic pulses that travel long distances and may disrupt important marine mammal behaviors (i.e., feeding, resting, migrating, breeding, calving) and—at close range—can cause physical or physiological injury (Gordon et al. 2004). The noise also can mask biologically important sounds, such as communication calls between conspecifics (Richardson et al. 1995). Baleen whales (right, humpback, fin, blue, and minke whales) are the most likely to be affected by the proposed activities because of their sensitivity to low frequency sounds, whereas other cetaceans could be adversely affected if close enough to the sound source.

The Bureau has received nine applications for geological and geophysical activities in the Atlantic. Eight of those have proposed two-dimensional seismic surveys in some or all of the area of interest to identify potential oil and gas reserves. The projected two-dimensional seismic activity in the south and mid-Atlantic for 2012 to 2020 exceeds the total level of seismic survey activity documented for the entire Atlantic from 1968 to 2005 (Minerals Management Service 2007). If seismic activities proceed as projected, the potential for multiple surveys of the same areas by different applicants is considerable (Figure E-19, page E-59)—especially during 2013 and 2014, the two years of highest projected seismic survey activity.

Conducting multiple seismic surveys of the same area will increase risks to marine mammals and marine ecosystems unnecessarily with no meaningful gain in information. Permitting unnecessarily duplicative surveys is contrary to the charge of balancing orderly resource development with protection of the human, marine, and coastal environments, as directed by the Outer Continental Shelf Lands Act of 1953 (43 U.S.C. 1331 et seq.), as amended. The Bureau stated that they considered coordinating and consolidating seismic surveys to eliminate duplication of survey effort but rejected this approach because the vessel spacing requirements of alternative B would limit concurrent surveys. The Commission agrees that alternative B would prohibit concurrent overlapping or immediately adjacent surveys, but it would not prevent two or more operators from conducting multiple, unnecessarily redundant seismic surveys of the same area at a different time of year or in subsequent years.

As the permitting authority for companies that conduct geological or geophysical exploration of the Outer Continental Shelf, the Bureau is responsible under the National Environmental Policy Act to identify and evaluate alternatives that avoid unnecessary adverse impacts on the environment. The Bureau also must ensure that permitted activities are compliant with the provisions of other federal laws, including the requirement under the Marine Mammal Protection Act that any permitted taking of marine mammals have a negligible and least practicable impact on the affected marine mammal species or stocks.

The Bureau's analysis of existing seismic survey data provides a comprehensive assessment of undiscovered technically recoverable oil and gas resources in the Atlantic (Post et al. 2012).

Rather than re-survey large areas of the Atlantic for which two-dimensional seismic surveys already exist, or conduct multiple overlapping surveys of the same areas, the Bureau should require the oil and gas industry to make the most use of existing, publicly available seismic data. The Bureau also should provide broader access to seismic data that has been collected but that may not yet be in the public domain. This could help to focus and restrict the scope of future surveys to areas that show the most promise for oil and gas development, especially considering that oil and gas resources in the south and mid-Atlantic are expected to be relatively small (Bureau of Ocean Energy Management 2011, Post et al. 2012). The Bureau also should encourage companies that are engaged in or interested in acquiring seismic data in the same areas to collaborate on data collection to limit the number of surveys that are required.

The Commission has emphasized the need to minimize redundant seismic surveys in the Gulf of Mexico and the Arctic. The Bureau has considered methods to achieve that objective under the current regulatory framework, but the Commission believes more could be done. To that end, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management increase its efforts to maximize the utility of seismic data while minimizing the number and impacts of new seismic studies. Steps that could be taken include—

- analyzing fully all existing, publicly available seismic data;
- encouraging industry to release seismic data that is not yet in the public domain;
- collaborating on seismic surveys in areas of common interest;
- limiting the geographic scope, frequency, sound output, and/or duration of surveys that occur in any given year, especially in preferred marine mammal habitat areas;
- having the Bureau conduct seismic surveys and making them available to the industry for a fee;
- auctioning the right to conduct seismic surveys in certain planning areas or blocks; and
- providing tax or other incentives to companies that use alternative, less harmful technologies for the collection of seismic data.

Clearly, the Bureau will need to engage the industry in identifying the best ways to move forward, but the Bureau will have to provide the leadership and retain decision-making authority to ensure the necessary progress.

### **Alternatives to airguns**

As noted previously, sound from seismic airguns poses a number of risks to marine mammals. In its draft environmental impact statement the Bureau discussed several alternative (i.e., non-airgun) technologies including the use of marine vibrators (vibro-seis), low-frequency acoustic sources, deep-towed acoustics/geophysics systems, low-frequency passive acoustic systems, and controlled source electromagnetic systems. Some may have the potential to replace airguns, but all are still in various stages of development and not yet commercially available for use on the scale considered in the proposed action. For that reason, the Bureau rejected an alternative that would have prohibited the use of seismic airguns.

Rather than immediately prohibiting airguns, the Bureau should seek an orderly transition by industry from airguns to alternative technologies. In addition to time, such a transition undoubtedly will require permitting incentives and additional research investments. But unless the Bureau steps forward and facilitates a transition to new, less harmful technologies, the development and use of those technologies will be stalled.

Marine vibroseis is a particularly promising and potentially less harmful alternative to airguns for collecting subsurface geophysical data (Weilgart 2010). The draft environmental impact statement indicates that it could be commercially viable within two to four years with additional investment in design and testing. This is well within the nine-year timeframe considered for the proposed action. Controlled source electromagnetic technology also provides an alternative to seismic airguns for characterizing oil and gas resources identified using traditional airgun surveys. That technology already has been used in Norway to direct three-dimensional surveys toward the most prospective oil and gas areas prior to drilling (pers. comm. D. Ridyard, EMGS).

Given the need for and potential of alternative technologies to replace or minimize the use of airguns, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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.

### **Baseline information**

A thorough evaluation of the potential impacts of geophysical surveys and related vessel activities on marine mammals and their habitats depends on the availability of good baseline information. That information is essential to inform efforts to identify and avoid potential harmful interactions with sensitive populations (e.g., those listed as threatened or endangered under the Endangered Species Act or depleted under the Marine Mammal Protection Act) and to minimize impacts on particularly sensitive areas (e.g., marine protected areas, national monuments, essential fish habitats, designated critical habitats, and biological hotspots or areas of particular biological richness). It also should be collected at temporal and spatial scales necessary to characterize the variability inherent in the affected ecosystem. For potentially affected marine mammals, the necessary information includes their stock structure, population status, abundance and trends, distribution and seasonal movements, habitat use patterns, and trophic relationships. For example, additional baseline data regarding migrating North Atlantic right whales could be collected using tagging or aerial surveys to assess their movement patterns (e.g., their distance from shore at different times of the year).

The Bureau has acknowledged that baseline information is lacking for many marine mammals in the area of interest. However, the Bureau has concluded that the cost of acquiring such information would be exorbitant and such information could not be collected in time to evaluate the impacts of the proposed action. The Commission agrees that the collection of comprehensive baseline information requires a long-term and consistent commitment of effort and resources, and

that federal funding for such studies has been limited. Nevertheless, such information is needed to inform decision-makers regarding whether, where, and under what conditions to conduct activities that could have acute or long-term adverse effects on marine mammals and other marine species. In addition, the Commission does not consider the cost of collecting such information to be exorbitant, particularly when viewed in the context of the billions of dollars involved in oil and gas development. In any given year, the total funding for marine mammal research and conservation is on the order of 200 million dollars or less. At the same time, the annual profits of some individual oil companies are in the tens of billions of dollars. Furthermore, the failure to invest in the necessary studies undermines our professed intent to manage our marine resources on the basis of sound science.

The Commission has long argued that the industry and regulatory agencies have a responsibility to ensure that the research needed to manage resource use is conducted in a timely and comprehensive manner. The Bureau's Environmental Studies Program, in collaboration with other federal agencies, has committed to providing multi-year funding to the National Marine Fisheries Service for the Atlantic Marine Assessment Program for Protected Species. That program is supporting a broad-scale, multi-year data collection of abundance and seasonal distribution data for marine mammals and other wildlife in the area of interest for geological and geophysical surveys. The Commission commends that joint effort as it will improve the quality of baseline information needed for assessments of marine mammal stocks. For that reason, it should continue to be a high priority for the Bureau. However, as noted by the Bureau, the resources provided still fall short of what is needed. The Commission believes that the Bureau and the industry need to find additional means of supporting essential research. The industry, in particular, should provide multi-year financial support for stock assessment surveys and stock structure research in areas where seismic surveys are proposed because the risks to marine mammals stem from their activities. The industry should consider efforts to address and manage these risks responsibly as a cost of doing business.

The development of a rigorous program to collect baseline information in the Atlantic, especially in advance of any future leasing activities, is well within existing scientific capacity and would require only a very small fraction of the total cost of developing energy resources in this region. A long-term and consistent investment in baseline data collection would ensure that the decisions regarding proposed survey activities are guided by the best available scientific information. For those reasons, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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.

### **Estimating takes**

The data used to estimate takes of marine mammals in the area of interest is based on incomplete or outdated stock assessment surveys. The Bureau used density estimates derived from limited shipboard surveys conducted between 1994 and 2006 by the National Marine Fisheries Service. The density estimates were then extrapolated to other areas for which density estimates

were not available, including areas beyond the exclusive economic zone. As a result, the reliability of the density estimates is uncertain, as are the resulting take estimates. In addition, the uncertainty has not been quantified and hence is not available and apparent to decision-makers. To better convey the uncertainty or reliability of the density and take estimates used in the draft environmental impact statement, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management provide confidence limits and sources of potential bias associated with the density and take estimates that were calculated for each species.

The Bureau used 160 dB re 1  $\mu$ Pa (rms) as the behavioral disturbance criteria for the calculation of Level B incidental takes from all sound sources, pulse and non-pulse. Although 160 dB re 1  $\mu$ Pa (rms) is appropriate for pulse signals, such as airguns, it is not appropriate for non-impulsive sound sources, such as chirp (shallow penetration) sub-bottom profilers. The National Marine Fisheries Service recently clarified that for non-impulsive sound sources, whether continuous or intermittent, Level B harassment is presumed to begin at received levels of 120 dB re 1  $\mu$ Pa (76 Fed. Reg. 43639). Consistent with that guidance, the Level B harassment zone should be calculated based on that threshold rather than 160 dB re 1  $\mu$ Pa. To address this concern, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management use the 120-dB re 1  $\mu$ Pa 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.

The Bureau also noted that certain activities (e.g., drilling of deep stratigraphic or shallow test wells, geotechnical bottom sampling for renewable energy site characterization) would generate continuous sounds associated with the drilling rig or the support vessel's dynamic positioning thrusters. However, the Bureau did not include those sound sources in its modeling or calculation of take estimates. To address this shortcoming, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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.

### **Mitigation, monitoring, and reporting measures**

Seismic airgun and high resolution geophysical surveys both use active sound sources that have the potential to take marine mammals by Level A or Level B harassment, as defined under the Marine Mammal Protection Act. Operators conducting those surveys are required to seek 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. In the case of cetaceans and pinnipeds, authorization is to be sought from the National Marine Fisheries Service and, in the case of manatees, from the Fish and Wildlife Service. The Bureau has not been consistent in its guidance to applicants regarding compliance with the Marine Mammal Protection Act, and this has led to confusion and litigation. To avoid confusion for applicants seeking permits to conduct geological and geophysical surveys in the south and mid-Atlantic, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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

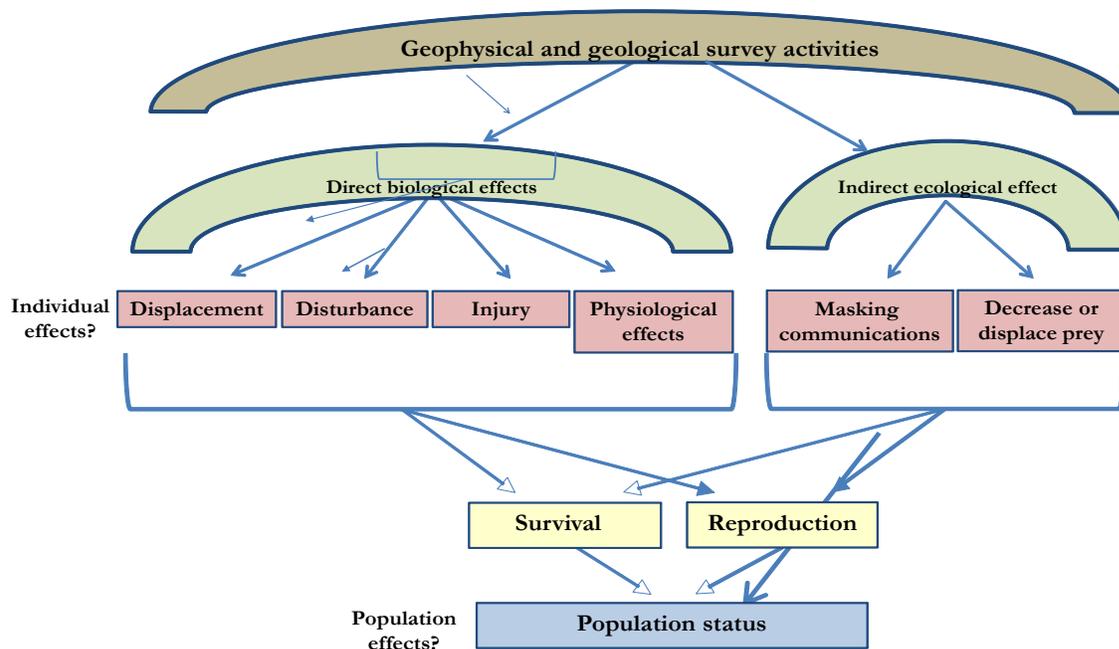
mammals incidental to those activities; such approval should also stipulate minimum requirements for mitigation, monitoring, and reporting, as outlined in Appendix C of the draft document.

The Bureau has proposed that the exclusion zone for each survey would be determined on a survey-specific basis, but in any case would not be less than 500 m for airgun seismic surveys and 200 m for high-resolution geophysical surveys. The Commission has previously commented on the need to obtain in-situ sound propagation measurements to calculate survey-specific exclusion zones, and commends the Bureau for including that provision in its proposed mitigation measures for both airgun surveys and high-resolution geophysical surveys.

As seismic airgun and high-resolution geophysical surveys both use active sound sources that have the potential to take marine mammals by Level A or Level B harassment, it is unclear why the Bureau has proposed different mitigation measures for the two types of surveys. The survey protocols proposed for high resolution geophysical surveys are inconsistent with those proposed by Cape Wind Associates for geophysical surveys, which included the use of ramp-up procedures, multiple observers, and a minimum 500-m exclusion zone. The Commission believes that the mitigation measures proposed for airgun surveys, including the use of passive acoustic monitoring as identified under alternative B and expanded to include also monitoring of high-resolution geophysical surveys, are minimal requirements for all surveys involving active sound sources. Therefore, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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.

Rigorous monitoring is needed to assess the effectiveness of mitigation measures and to determine the effects of survey activities on marine mammals at different times and in different locations. Such effects often are assessed by measuring changes from baseline conditions. The monitoring program should follow hypothesis-driven, standardized protocols for data collection to facilitate consistency in data collection and analysis, whether by industry, government, or contracted researchers. Monitoring protocols should be rigorous enough to detect effects caused by specific survey activities or other key anthropogenic or natural events that may be occurring at the same time in the project area. Figure 1 represents a conceptual framework that could be used to guide the development of monitoring protocols (adapted from MMC 2011). For that purpose, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management develop comprehensive, standardized monitoring protocols for assessing the effects of geological and geophysical surveys and associated activities on marine mammals.

The Bureau's recently published summary of seismic survey mitigation measures and marine mammal observer reports indicated that the presence of marine mammals and the resulting ramp-up and shut-down procedures do not cause frequent delays during surveys (Barkaszi et al. 2012). The summary also indicated that shut-down procedures in response to sightings of small cetaceans also would not cause significant delays. The Commission has commented on several occasions that



**Figure 1.** Conceptual framework for assessing the effects of geophysical and geological survey and associated activities on marine mammals.

shut-down procedures should be used to protect all marine mammals, not just whales, and the analysis in the summary report suggests that implementing this recommendation would not create significant economic concerns. Indeed, the Bureau proposes to require that ramp-up and shut-down procedures be used to protect all marine mammals. The one situation where this may not be feasible is when dolphins approach a vessel or towed equipment to bow-ride or draft off the equipment. The frequency of such interactions and the best ways to manage them are not clear. To provide that information, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management prepare annual summaries of marine mammal observer reports, including an analysis of the frequency and outcome of all marine mammal-vessel interactions.

Incidental harassment authorizations issued under sections 101(a)(5)(A) and 101(a)(5)(D) generally require reporting of all injured or dead marine mammals. The Bureau’s proposed activities have the potential to harass marine mammals. Therefore, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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 (e.g., a fresh dead carcass is found).

## Cumulative effects

The Bureau's analysis of cumulative effects evaluated the incremental increase of certain aspects of the proposed action when added to other impacts of a similar nature (for example, the incremental increase in sound from the proposed active acoustic surveys when added to other sources of underwater noise). However, the analysis falls short in evaluating the combined effect of all impacts resulting from the proposed action when compared to all existing and reasonably foreseeable future actions. The Commission recognizes the difficulty in monitoring and evaluating the individual effects of specific activities on marine mammals, let alone the combined effects of multiple activities in a constantly changing environment. This is especially true considering that effects resulting from the proposed action likely will involve behavioral changes in the affected marine mammals and/or indirect effects on prey species, the long-term biological significance of which are harder to assess than the significance of acute effects such as injuries or mortalities.

Nevertheless, numerous guidelines are available for developing a conceptual framework to analyze the cumulative effects of sound and other stressors on marine mammals and the marine environment (Council on Environmental Quality 1997, National Research Council 2005, Moore et al. 2012). A comprehensive analytical framework is necessary to determine if, when, and where marine resources, including marine mammals, are being exposed to cumulative effects that reduce their status or hinder their potential to grow and recover. Therefore, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management 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.

Please contact me if you have questions about the Commission's recommendations or comments.

Sincerely,



Timothy J. Ragen, Ph.D.  
Executive Director

cc: Michael Payne, National Marine Fisheries Service

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