



MARINE MAMMAL COMMISSION

28 February 2012

Mr. James H. Lecky, Director
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway, Room 13705
Silver Spring, MD 20910-6233

Dear Mr. Lecky:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed (1) the draft environmental impact statement prepared by the National Marine Fisheries Service, in cooperation with the Bureau of Ocean Energy Management, on the effects of oil and gas activities in the Arctic Ocean and (2) the associated 30 December 2011 *Federal Register* notice (76 Fed. Reg. 82275). The Commission provides the following recommendations and rationale.

RECOMMENDATIONS

The Marine Mammal Commission recommends that the National Marine Fisheries Service—

- (1) work with the Bureau of Ocean Energy Management to conduct supplemental activity-specific environmental analyses under the National Environmental Policy Act that provide detailed information on proposed seismic surveys and drilling activities and the associated environmental effects, (2) work with the Bureau and industry to ensure that the necessary information is available to estimate the number of takes as accurately as possible given current methods and data, (3) encourage the Bureau to make activity-specific analyses available for public review and comment rather than issuing memoranda to the file or categorical exclusions that do not allow for public review/comment, and (4) encourage the Bureau to make those analyses available for public review and comment before the Service makes its final determination regarding applications for incidental take authorizations;
- work with the Bureau of Ocean Energy Management to expand the draft environmental impact statement to include a broader range of alternatives that ensure that oil and gas activities have no more than a negligible impact on marine mammal species and stocks and will not have adverse impacts on the Alaska Native communities that depend on the availability of marine mammals for subsistence, as required under the Marine Mammal Protection Act; additional alternatives should include a phased approach for increasing oil and gas activities, avoidance of redundant seismic surveys, development of a soundscape approach and consideration of caps on noise or activity levels for managing sound sources during the open-water period, and a clear basis for judging whether the impacts of the industry's activities are, indeed, negligible as required by the Act;
- identify its preferred alternative, including the rationale for its selection;
- work with the Bureau of Ocean Energy Management to estimate the site-specific acoustic footprints for each sound threshold (i.e., 190, 180, 160, and 120 dB re 1 μ Pa) and the

- expected number of marine mammal takes, accounting for all types of sound sources and their cumulative impacts;
- work with the Bureau of Ocean Energy Management and other entities as appropriate to establish and fully support programs designed to collect and synthesize the relevant scientific information and traditional knowledge necessary to evaluate and predict the long-term and cumulative effects of oil and gas activities on Arctic marine mammals and their environment;
- revise the draft environmental impact statement to include a fuller analysis of each alternative and discuss whether it meets the requirements of the Marine Mammal Protection Act for issuing incidental take authorizations; to the extent that the information needed to make the determinations required under the Marine Mammal Protection Act is lacking, the Service should take steps to ensure that this information is available before an authorization is issued and should acknowledge that supplemental environmental analyses under the National Environmental Policy Act may be necessary;
- work with the Bureau of Ocean Energy Management to incorporate a broader list of mitigation measures that would be standard for all oil and gas-related incidental take authorizations in the Arctic region (as identified below);
- include additional measures to verify compliance with mitigation measures and work with the Bureau of Ocean Energy Management and industry to improve the quality and usefulness of mitigation and monitoring measures (as identified below); and
- work with the Bureau of Ocean Energy Management, Fish and Wildlife Service, U.S. Geological Survey, state of Alaska, North Slope Borough, Alaska Native organizations, academia, non-governmental organizations, and industry to develop a comprehensive, long-term monitoring program for the Arctic ecosystem, including its marine mammal populations.

RATIONALE

Programmatic approach and site-specific analyses

The exploration, development, and production of oil and gas reserves in the Beaufort and Chukchi Seas may significantly affect Arctic marine mammal populations and the ocean and coastal ecosystems on which they depend. Risks include exposure to sound from seismic surveys and drilling operations; disturbance from aircraft and vessel traffic; habitat degradation from discharges of oil, drilling wastes, or other materials (e.g., fuel); and exposure to oil and other chemicals from an oil spill or other major discharge. Oil and gas activities also can reduce the availability of marine mammals to Alaska Native communities for subsistence purposes.

Federal agencies are required to comply with the National Environmental Policy Act before they make final decisions about proposed federal actions that could impact the human environment. Under that Act, the Bureau conducts analyses at various stages of the leasing, exploration, and development process to evaluate the environmental and socioeconomic effects of oil and gas activities authorized under the Outer Continental Shelf Lands Act and to issue related permits. The Service is responsible for issuing incidental take authorizations under section 101(a)(5) of the Marine

Mammal Protection Act. Prior to issuance, the Service typically prepares environmental assessments to evaluate the effects of issuing authorizations to take marine mammals incidental to proposed oil and gas activities and any proposed mitigation and monitoring measures.

The National Marine Fisheries Service and the Bureau of Ocean Energy Management jointly prepared the subject draft environmental impact statement to evaluate (1) the Service's issuance of incidental take authorizations for exploration activities that include deep penetration (two-dimensional and three-dimensional) geophysical surveys, high resolution site clearance and shallow hazards surveys, and exploratory drilling, and (2) the Bureau's issuance of permits under the Outer Continental Shelf Lands Act for geological and geophysical surveys and ancillary activities. The document is intended to provide a programmatic evaluation of pre-production oil and gas activities planned in the U.S. Arctic during a five-year period and their cumulative effects.

The Marine Mammal Commission agrees that a programmatic approach is warranted and timely considering the expected increases in oil and gas exploration activities in the U.S. Arctic coupled with the effects of climate disruption and increasing human activities in the region. A programmatic approach should help ensure that a systematic, interdisciplinary approach is used to determine the environmental impact of the proposed actions as required by the National Environmental Policy Act, and that the sum of all risk factors do not cause "undue or serious harm or damage to the human, marine, or coastal environment," as required by the Outer Continental Shelf Lands Act (30 C.F.R. § 250.202), and are not having more than a negligible impact on affected marine mammal stocks or an unmitigable adverse impact on the availability of marine mammals for subsistence uses, as required by the Marine Mammal Protection Act (50 C.F.R. § 216.104).

The Service has stated that it "intends to use this [environmental impact statement] as the required [National Environmental Policy Act] documentation for the issuance of [incidental take authorizations] for Arctic oil and gas exploration activities." However, the Service has provided only conceptual examples of the temporal and spatial distribution of proposed activities under each alternative and the maps and figures provided do not include all possible activities considered for each alternative or how these activities might overlap spatially and temporally. In fact, the lack of specific information precludes a full assessment of the potential effects of the combined activities, including such things as an estimation of the number of takes for species that transit through the action area during the timeframe being considered. Similarly, the range of airgun volumes, source levels, and distances to the 190-, 180-, 160-, and 120-dB re 1 μ Pa harassment thresholds (Table 4.5-10, which are based on measurements from past surveys) vary markedly and cannot be used to determine with any confidence the full extent of harassment of marine mammals. Such assessment requires modeling of site-specific operational and environmental parameters, which is simply not possible based on the information in this programmatic assessment.

For those and related reasons, the draft environmental impact statement does not provide an adequate basis for the issuance of the Service's incidental take authorizations. Absent important information on the number and nature of potential takes that may occur incidental to the proposed activities, the Service cannot make an informed, science-based judgment as to whether those takes

will involve a small number of animals and whether their total impact will be negligible as required under the Marine Mammal Protection Act. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service (1) work with the Bureau of Ocean Energy Management to conduct supplemental activity-specific environmental analyses under the National Environmental Policy Act that provide detailed information on proposed seismic surveys and drilling activities and the associated environmental effects, (2) work with the Bureau and industry to ensure that the necessary information is available to estimate the number of takes as accurately as possible given current methods and data, (3) encourage the Bureau to make activity-specific analyses available for public review and comment rather than issuing memoranda to the file or categorical exclusions that do not allow for public review/comment, and (4) encourage the Bureau to make those analyses available for public review and comment before the Service makes its final determination regarding applications for incidental take authorizations.

Selection of alternatives

The Service and the Bureau have identified five alternatives, including (1) the no-action alternative; (2) authorization of “Level 1” exploration activities, (3) authorization of “Level 2” exploration activities, (4) authorization of Level 2 exploration activities with time/area closures; and (5) authorization of Level 2 exploration activities with the use of alternative technologies. Activities associated with Level 1 and Level 2 exploration activities are summarized in Table 1. With the exception of the no-action alternative, the Service has indicated that each of the action alternatives would require a suite of “standard” mitigation measures and also could require one or more “additional” mitigation measures as necessary.

Table 1. Summary of exploration activity levels considered in the draft environmental impact statement associated with alternatives 2, 3, 4, and 5 (adapted from page 4-6)

Level 1 Exploration Activities (alternative 2)	Level 2 Exploration Activities (alternatives 3, 4, and 5)
Two 2D/3D deep penetration towed-streamer seismic surveys in the Beaufort Sea and two of the same types of surveys in the Chukchi Sea, per year	Three 2D/3D deep penetration towed-streamer seismic surveys in the Beaufort Sea and four of the same types of surveys in the Chukchi Sea, per year
One in-ice towed streamer 2D survey (using icebreaker) in the Beaufort Sea and one of the same types of surveys in the Chukchi Sea, per year	One in-ice towed streamer 2D survey (using icebreaker) in the Beaufort Sea and one of the same types of surveys in the Chukchi Sea, per year
One ocean bottom cable survey in the Beaufort Sea, per year	Two ocean bottom cable surveys in the Beaufort Sea, per year
One on-ice vibroseis seismic survey in the Beaufort Sea, per year	One on-ice vibroseis seismic survey in the Beaufort Sea, per year
Three site clearance and high-resolution shallow hazards survey programs in the Beaufort Sea and three of the same types of surveys in the	Five site clearance and high-resolution shallow hazards survey programs in the Beaufort Sea and five of the same types of surveys in the Chukchi

Level 1 Exploration Activities (alternative 2)	Level 2 Exploration Activities (alternatives 3, 4, and 5)
Chukchi Sea, per year	Sea, per year
One exploratory drilling program in the Beaufort Sea and one exploratory drilling program in the Chukchi Sea, per year	Two exploratory drilling programs in the Beaufort Sea and two exploratory drilling programs in the Chukchi Sea, per year

The draft environmental impact statement indicates that the Service’s objectives are to “evaluate a broad range of reasonably foreseeable levels of exploration activities, ... including the use of alternative technologies and methodologies intended to reduce the amount and/or intensity of sound output, in state and federal waters in the U.S. Beaufort and Chukchi seas” (page 1-9). However, the range of action alternatives considers only two levels of activity, with the lower level of activity (i.e., alternative 2) resulting in a total acoustic footprint that would be significantly greater than at any time since the 1980s (pages 4-44 to 4-47). In addition, the narrow range of alternatives and the lack of specificity regarding the source levels, timing, duration, and location of the activities being considered do not provide a sufficient basis for determining whether other options might exist for oil and gas development with significantly less environmental impact, including reduced effects on marine mammals. Providing a broader range of activity levels (i.e., alternatives) with more specificity regarding the spatial, temporal, and operational characteristics of associated activity levels seems essential to ensure the least practicable impact to marine mammal species and stocks and their habitats, as required under the Marine Mammal Protection Act.

The Service and Bureau also should have considered a phased, adaptive approach to increasing the number of surveys in the region because the cumulative effects of seismic surveys are not clear. The Commission has previously recommended a go-slow approach to allow time for assessing the impacts of increasing activity levels. Such an approach would provide an opportunity to monitor and manage effects before they become significant and also would help prevent situations where the industry has over-committed its resources to activities that may cause unacceptable harm.

In addition, the Service and Bureau should have considered various strategies for avoiding unnecessarily redundant seismic surveys as a way of ensuring the least practicable impact on marine mammals and the environment. Because some companies conduct geophysical surveys for the purpose of selling the data, those data could be made available to multiple companies, avoiding the need for each company to commission separate surveys. Careful management of the number and timing of surveys will be particularly important in this region because the surveys will be limited in space and time to open waters, when multiple species of marine mammals use the same areas for feeding, reproduction, and migration. Rather than exclude the possibility of avoiding redundant seismic surveys outright, such options should have been included and evaluated in the draft environmental impact statement to ensure that decision makers are informed by consideration of a full suite of alternatives that sharply define the issues.

Other possible alternatives excluded from further consideration included caps on noise or activity levels. As rationale for this decision, the draft environmental impact statement maintains that the concept of a sound ‘budget’ “implies a quantitative management of total sound that cannot currently be supported by the science” (page 2-46). The Commission disagrees. The Arctic “soundscape” should be relatively easy to describe and manage compared to the soundscapes of other regions. In the Arctic, sound levels follow a highly distinct seasonal pattern dominated in winter by ice-related sound and then altered by sound from wind, waves, vessels, seismic surveys, and drilling in the open-water period. The sound signatures (i.e., frequency, intensity, duration, variability) of the various sources are either well known or easily described and, for any given region, they should be relatively predictable. The primary source of anthropogenic sound in the Arctic during the open-water season is oil and gas-related seismic activity, and those activities can elevate sound levels by 2–8 dB (Roth et al. 2012). The Service and Bureau should be able to compare the seasonal variations in the soundscape to the movement patterns and natural histories of marine mammals and to subsistence hunting patterns.

Clearly, oil and gas companies are making an effort to avoid portions of the bowhead whale hunting grounds during the whales’ migration, and similar efforts could be made to protect beluga whales, walrus, ice seals, and the hunters who depend on them. By carefully comparing the soundscape to marine mammal natural history and subsistence hunting patterns, the Bureau and industry would have a stronger scientific foundation from which to make reasoned judgments regarding which activities will result in the least practicable impact on these species. Using this information, the Service and Bureau should be able to place limits on the number, timing, and type of seismic activities permitted annually, at least until the long-term, population-level effects of seismic operations on marine mammals and other marine species are fully understood. The Arctic is, in fact, one region where limits on sound-generating activities can be implemented pro-actively, before other human activities (e.g., shipping and tourism) increase. Developing an inventory/database of seismic sound sources used in the Arctic, as suggested by the U.S. Geological Survey, would be a good first step (Hutchinson and Ferrero 2011). Such a database “may ultimately reduce the need for expensive or redundant acoustic modeling and monitoring, especially in sensitive or biologically significant habitats, as well as contribute to developing more effective mitigation strategies.”

The Service is proposing to authorize up to 12 seismic surveys and 2 drilling programs in the Beaufort Sea and 10 surveys and 2 drilling programs in the Chukchi Sea each year. The Service concludes that this level of activity will result in moderate impacts on bowhead whales; beluga whales; subsistence hunting; air quality; acoustics; visual resources; and land and water ownership, use, and management. The Commission does not understand the scientific justification for that conclusion given uncertainties regarding the long-term, population-level effects that may result from the proposed level of seismic and drilling activities on marine mammals. It also is not clear that the proposed number of surveys, individually or in combination, will have no more than a negligible impact on marine mammals, the threshold for issuing an incidental take authorization under the Marine Mammal Protection Act. How can moderate impacts be deemed negligible? To ensure that seismic survey activities and the associated impacts are, indeed, negligible and at the least practicable

level for purposes of the Marine Mammal Protection Act, the permitted activity level should not exceed what is absolutely essential for the industry to conduct.

In addition, the Service does not indicate which of the five identified alternatives is considered the “preferred” alternative. Presumably the selection of a preferred alternative would be based, at least in part, on an analysis of which alternative and associated effects have the least practicable impact on marine mammals. However, the Service does not provide any discussion of the criteria that will ultimately be used as the basis for its selection of a preferred alternative.

For these reasons, the Marine Mammal Commission recommends that the National Marine Fisheries Service work with the Bureau of Ocean Energy Management to expand the draft environmental impact statement to include a broader range of alternatives that ensure that oil and gas related activities have no more than a negligible impact on marine mammal species and stocks and will not have adverse impacts on the Alaska Native communities that depend on the availability of marine mammals for subsistence, as required under the Marine Mammal Protection Act. Additional alternatives should include a phased, adaptive approach for increasing oil and gas activities, avoidance of redundant seismic surveys, development of a soundscape approach and consideration of caps on noise or activity levels for managing sound sources during the open-water period, and a clear basis for judging whether the impacts of the industry’s activities are, indeed, negligible as required by the Act. The Commission further recommends that the Service identify its preferred alternative, including the rationale for its selection.

Impacts on marine mammals and analytical gaps

The draft environmental impact statement describes the affected environment and expected impacts from the proposed activities. Again, the statement does not explain how decision makers can draw definitive conclusions regarding potential effects on marine mammals or other ecosystem components given the lack of details for the operations identified under each alternative. The uncertainty is evident in the Service’s assessment of effects on bowhead whales resulting from alternative 2—“Oil and gas exploration activities in the Beaufort and Chukchi seas, as allowed under [a]lternative 2, would likely cause varying degrees of disturbance to feeding, resting, or migrating bowhead whales depending on actual level of effort, type of activity, time of year, and whether activities run concurrent in the Beaufort and Chukchi seas” (page 4-110). This type of vague, qualitative information is not sufficient to inform decision makers of the risks involved and the best means for managing or minimizing those risks.

For example, the Service’s analysis of sound sources and associated acoustic footprints is based on the average distances from the sound sources to the various sound threshold levels used by the Service to delineate harassment, as measured during previous seismic surveys of various types, rather than actual modeling of propagation loss associated with the proposed types and numbers of sound sources. The Commission believes that decision makers need more specific information because these sound sources may ensonify large portions of the Chukchi and Beaufort Seas. For example, the Service has estimated that alternative 2 would ensonify 35 percent of the Chukchi Sea and 14 percent of the Beaufort Sea at the 120-dB re 1 μ Pa threshold (page 4-50); whereas,

alternative 3 would ensonify 58 percent of the Chukchi Sea and 19 percent of the Beaufort Sea at the 120-dB re 1 μ Pa threshold (page 4-245). The significance of these estimates is difficult to interpret and predict given the vague set of assumptions on which they are based.

The Commission also has noted several omissions and inadequacies in the Service's analysis of impacts. For example, the Service states that the vertical seismic profilers and vertical cable surveys are used as part of the drilling program, yet the Service has not analyzed the effects of those sound sources as part of the proposed drilling operations. Vertical seismic profilers are airgun arrays with the potential to generate source levels at or above 238 dB re 1 μ Pa at 1 m (Shell 2011). In addition, the Service has not analyzed the combined effects of proposed new activities plus production drilling at BP's Liberty prospect, even though this drilling project is likely to go forward in the timeframe covered by the draft environmental impact statement. To assess the effects of the proposed oil and gas exploration activities under the Marine Mammal Protection Act, the Marine Mammal Commission recommends that the National Marine Fisheries Service work with the Bureau of Ocean Energy Management to estimate the site-specific acoustic footprints for each sound threshold (i.e., 190, 180, 160, and 120 dB re 1 μ Pa) and the expected number of marine mammal takes, accounting for all types of sound sources and their cumulative impacts.

To predict the expected effects of oil and gas and other activities more accurately, the Commission agrees with the U.S. Geological Survey that a broader synthesis and integration of available information on bowhead whales and other marine mammals is needed. That synthesis should incorporate such factors as ambient sound levels, natural and anthropogenic sound sources, abundance, movement patterns, the oceanographic features that influence feeding and reproductive behavior, and traditional knowledge (Hutchinson and Ferrero 2011). As noted above, the U.S. Geological Survey's recommendation to develop an inventory/database of seismic sound sources used in the Arctic would be a good first step toward a better understanding of long-term, population-level effects of seismic and drilling activities. Two recent projects that will help further such an integrated approach are NOAA's recently launched Synthesis of Arctic Research (SOAR) and the North Pacific Marine Research Institute's industry-supported synthesis of existing scientific and traditional knowledge of Bering Strait and Arctic Ocean marine ecosystem information.

An ecosystem-wide, integrated synthesis of available information would help identify important data gaps that exist for Arctic marine mammals, particularly for lesser-studied species such as beluga whales, walrus, and ice seals. It also would help the agencies better understand and predict the long-term, cumulative effects of the proposed activities, in light of increasing human activities in the Arctic and changing climatic conditions. Therefore, the Marine Mammal Commission recommends that the Service work with the Bureau and other entities as appropriate to establish and fully support programs designed to collect and synthesize the relevant scientific information and traditional knowledge necessary to evaluate and predict the long-term and cumulative effects of oil and gas activities on Arctic marine mammals and their environment.

Marine Mammal Protection Act standards

The Service has developed “impact criteria” for the draft environmental impact statement to evaluate each of the alternatives and its potential impacts on biological and socioeconomic resources. These criteria range from negligible to major, using terms and thresholds that are quantitative for some components and qualitative for others. For alternative 2 (Level 1 activities), impacts are identified as moderate for subsistence, minor to moderate for bowhead and beluga whales, and minor for other marine mammal species. For alternatives 3 (Level 2 activities) and 5 (Level 2 activities with alternative technologies), impacts are identified as moderate for subsistence, bowheads, and belugas, and minor for other marine mammal species. For alternative 4 (Level 2 activities with time/area closures), impacts are identified as moderate for bowhead and beluga whales and minor for other marine mammal species and subsistence. The Service concludes that even at the higher level of activity (Level 2 activities) bowhead whales will be displaced only temporarily, but that long-term effects are unknown. It goes on to state that the extent of the impact would depend on the number of seismic activities and associated support vessels in an area, and that multiple seismic activities in one area or in several areas across the bowhead migratory corridor could lead to more widespread, regional impacts.

Although these criteria may be considered sufficient for purposes of the analyses required under the National Environmental Policy Act, they do not necessarily meet the standards applicable under the Marine Mammal Protection Act for issuing incidental take authorizations—that only small numbers of animals are taken, that such takes have no more than a negligible impact on the affected marine mammal species and stocks, and that the activities do not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses. The Commission believes that any analysis of potential impacts at this stage is speculative at best because of the lack of definitive information regarding sound source levels, the type and duration of proposed exploration activities, and the mitigation measures that each operator would be required to meet. However, before an incidental take authorization can be issued, the Service will need such information to make the findings required under the Marine Mammal Protection Act. To ensure that is the case, the Marine Mammal Commission recommends that the National Marine Fisheries Service revise the draft environmental impact statement to include a fuller analysis of each alternative and discuss whether it meets the requirements of the Marine Mammal Protection Act for issuing incidental take authorizations. To the extent that the information needed to make the determinations required under the Marine Mammal Protection Act is lacking, the Service should take steps to ensure that this information is available before an authorization is issued and should acknowledge that supplemental environmental analyses under the National Environmental Policy Act may be necessary.

Mitigation and monitoring measures

The Service has identified a suite of standard mitigation measures that would be applied to all authorized activities and additional, specific measures that would be required only for certain activities or operators, as appropriate. The Commission agrees that the list of standard mitigation measures should be incorporated in all incidental take authorizations issued by the Service and also should be included under the terms and conditions for the Bureau’s issuance of geological and

geophysical permits and ancillary activity and exploratory drilling approvals. However, the Commission believes that many of the “additional” mitigation measures should be expanded and included as standard conditions.

The following is a summary of mitigation measures that the Commission has recommended in incidental harassment authorizations for other proposed oil and gas activities. The various rationales for including those measures can be found in past letters to the Service and are not repeated here. The Marine Mammal Commission recommends that the National Marine Fisheries Service work with the Bureau of Ocean Energy Management to incorporate a broader list of mitigation measures that would be standard for all oil and gas-related incidental take authorizations in the Arctic region, including:

- a) Detection-based measures intended to reduce near-source acoustic impacts on marine mammals
 - require operators to use operational- and activity-specific information to estimate exclusion and buffer zones for all sound sources (including seismic surveys, sub-bottom profilers, vertical seismic profiling, vertical cable surveys, drilling, icebreaking, support aircraft and vessels, etc.) and, just prior to or as the activity begins, verify and (as needed) modify those zones using sound measurements collected at each site for each sound source;
 - assess the efficacy of mitigation and monitoring measures and improve detection capabilities in low visibility situations using tools such as forward-looking infrared or 360° thermal imaging;
 - require the use of passive acoustic monitoring to increase detection probability for real-time mitigation and monitoring of exclusion zones; and
 - require operators to cease operations when the exclusion zone is obscured by poor sighting conditions;
- b) Non-detection-based measures intended to lessen the severity of acoustic impacts on marine mammals or reduce overall numbers taken by acoustic sources
 - limit aircraft overflights to an altitude of 457 m or higher and a horizontal distance of 305 m or greater when marine mammals are present (except during takeoff, landing, or an emergency situation)¹;
 - require temporal/spatial limitations to minimize impacts in particularly important habitats or migratory areas, including but not limited to those identified for time-area closures under Alternative 4 (i.e., Camden Bay, Barrow Canyon/Western Beaufort Sea, Hanna Shoal, the Beaufort Sea shelf break, and Kasegaluk Lagoon/Ledy Bay critical habitat);
 - prevent concurrent, geographically overlapping surveys and surveys that would provide the same information as previous surveys; and
 - restrict 2D/3D surveys from operating within 145 km of one another;
- c) Measures intended to reduce/lessen non-acoustic impacts on marine mammals

¹ Flight altitudes were included as an additional mitigation measure, but a specific minimum altitude was not identified.

- reduce vessel speed to 9 knots or less when transiting the Beaufort Sea²;
 - reduce vessel speed to 9 knots or less within 274 m of whales^{2,3};
 - avoid changes in vessel direction and speed within 274 m of whales³;
 - reduce speed to 9 knots or less in inclement weather or reduced visibility conditions²;
 - use shipping or transit routes that avoid areas where marine mammals may occur in high densities, such as offshore ice leads;
 - establish and monitor a 160-dB re 1 μ Pa zone for large whales around all sound sources and do not initiate or continue an activity if an aggregation of bowhead whales or gray whales (12 or more whales of any age/sex class that appear to be engaged in a non-migratory, significant biological behavior (e.g., feeding, socializing)) is observed within that zone;
 - require operators to cease drilling operations in mid- to late-September to reduce the possibility of having to respond to a large oil spill in ice conditions;
 - require operators to develop and implement a detailed, comprehensive, and coordinated Wildlife Protection Plan that includes strategies and sufficient resources for minimizing contamination of sensitive marine mammal habitats and that provides a realistic description of the actions that operators can take, if any, to deter animals from spill areas or respond to oiled or otherwise affected marine mammals—the plan should be developed in consultation with Alaska Native communities (including marine mammal co-management organizations), state and federal resource agencies, and experienced non-governmental organizations; and
 - require operators to collect all new and used drilling muds and cuttings and either re-inject them or transport them to an Environmental Protection Agency-licensed treatment/disposal site outside the Arctic;
- d) Measures intended to ensure no unmitigable adverse impact to subsistence users
- require the use of Subsistence Advisors; and
 - facilitate development of more comprehensive plans of cooperation/conflict avoidance agreements that involve all potentially affected communities and co-management organizations and account for potential adverse impacts on all marine mammal species taken for subsistence purposes.

The Marine Mammal Commission also recommends that the National Marine Fisheries Service include additional measures to verify compliance with mitigation measures and work with the Bureau and industry to improve the quality and usefulness of mitigation and monitoring measures:

- track and enforce each operator's implementation of mitigation and monitoring measures to ensure that they are executed as expected;

² Reduced vessel speeds were included as an additional mitigation measure, but a specific maximum vessel speed was not identified.

³ The specific distance at which vessels should exercise caution when around whales was not identified.

- provide guidance to operators regarding the estimation of the number of takes during the course of an activity (e.g., seismic survey)—that guidance should be sufficiently specific to ensure that take estimates are accurate and include realistic estimates of precision and bias;
- provide additional justification for the determination that the mitigation and monitoring measures that depend on visual observations would be sufficient to detect, with a high level of confidence, all marine mammals within or entering identified mitigation zones;
- work with protected species observers, observer service providers, the Fish and Wildlife Service, and other stakeholders to establish and implement standards for protected species observers to improve the quality and usefulness of information collected during exploration activities;
- establish requirements for analysis of data collected by protected species observers to ensure that those data are used both to estimate potential effects on marine mammals and to inform the continuing development of mitigation and monitoring measures;
- require operators to make the data associated with monitoring programs publicly available for evaluation by independent researchers;
- require operators to gather the necessary data and work with the Bureau and the Service to assess the effectiveness of soft-starts as a mitigation measure; and
- require operators to suspend operations immediately if a dead or seriously injured marine mammal is found in the vicinity of the operations and the death or injury could be attributed to the applicant's activities—any suspension should remain in place until the Service has reviewed the situation and determined that further deaths or serious injuries are unlikely or has issued regulations authorizing such takes under section 101(a)(5)(A) of the Act.

Comprehensive monitoring program

In addition to project-specific monitoring measures, the Commission believes that a comprehensive, long-term monitoring program is needed for the Arctic to ensure that its rapidly changing marine environment is adequately protected from the adverse effects of oil and gas exploration and development and other human activities. Clearly, the Bureau and the Service cannot be solely responsible for such a program—it must be coordinated with key partners, including the Fish and Wildlife Service, U.S. Geological Survey, the state of Alaska, the North Slope Borough, Alaska Native organizations, academia, non-governmental organizations, and industry. The program should include a strategy for assessing the status of marine mammal populations, characterizing important natural history traits including habitat use, determining vulnerability to risks from all human activities, and identifying and developing appropriate mitigation and monitoring measures. A number of research tools are available for collecting this information, including vessel and aircraft surveys, passive acoustics, photo-identification studies, biopsy sampling, telemetry tagging, and information obtained from stranded and subsistence-harvested animals. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service work with the Bureau of Ocean Energy Management, Fish and Wildlife Service, U.S. Geological Survey, state of Alaska, North Slope Borough, Alaska Native organizations, academia, non-governmental organizations, and industry to develop a comprehensive, long-term monitoring program for the Arctic ecosystem, including its marine mammal populations.

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

Sincerely,

A handwritten signature in blue ink that reads "Timothy J. Ragen". The signature is written in a cursive style with a large initial 'T'.

Timothy J. Ragen, Ph.D.
Executive Director

cc: Dr. James Kendall, Bureau of Ocean Energy Management, Alaska Outer Continental Shelf Region, Anchorage, AK
Dr. Kim Rivera, National Marine Fisheries Service, Alaska Regional Office, Juneau, AK
Jenifer Kohout, Marine Mammals Management Office, Anchorage, AK

References

Hutchinson, D.R., and R.C. Ferrero. 2011. Chapter 6. Marine mammals and anthropogenic noise. Pages 165-202 *in* L. Holland-Bartels and B. Pierce (eds.), An evaluation of the science needs to inform decisions on Outer Continental Shelf energy development in the Chukchi and Beaufort Seas, Alaska: U.S. Geological Survey Circular 1370.

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