



# MARINE MAMMAL COMMISSION

13 June 2013

Mr. P. Michael Payne, Chief  
Permits and Conservation Division  
Office of Protected Resources  
National Marine Fisheries Service  
1315 East-West Highway  
Silver Spring, Maryland 20910-3226

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application from Shell Gulf of Mexico Inc. (Shell), seeking an incidental harassment authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act. Shell is seeking authorization to take small numbers of marine mammals by harassment incidental to various activities in the Alaskan Chukchi Sea during the 2013 Arctic open-water season. The Commission also has reviewed the National Marine Fisheries Service's 14 May 2013 notice (78 Fed. Reg. 28412), announcing receipt of the application and proposing to issue the authorization, subject to certain conditions.

## RECOMMENDATIONS

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

- continue to include proposed incidental harassment authorization language at the end of future *Federal Register* notices but ensure that the language is consistent with that referenced in the main body of the corresponding notice;
- encourage the development of a conflict avoidance agreement for Shell's proposed activities that involves all potentially affected communities and co-management organizations and that accounts for potential adverse impacts on all marine mammal species taken for subsistence purposes including, but not limited to, bowhead whales;
- require Shell to revise its take estimates to include Level B harassment takes associated with its ice gouge survey;
- require Shell to 1) estimate the numbers of marine mammals taken in the ice gouge survey and 2) base that estimate on the 120-dB re 1  $\mu$ Pa threshold rather than the 160-dB re 1  $\mu$ Pa threshold;
- consult with experts in the field of sound propagation and marine mammal hearing to revise the acoustic criteria and thresholds as necessary to specify threshold levels that would be more appropriate for a wider range of sound sources, including shallow penetration sub-bottom profilers, echosounders, and side-scan sonar;
- use species-specific maximum density estimates as a basis for estimating the expected number of takes;
- require Shell to conduct sound source verification for the ice gouge survey at varying depths;

- require Shell to report the preliminary results of its in-situ sound source and sound propagation measurements within five days;
- only authorize an in-season adjustment in the size of the exclusion and/or disturbance zones if the size(s) of the estimated zones are determined to be inadequate;
- require Shell to not initiate or continue seismic activities if (1) 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 the 160-dB re 1  $\mu$ Pa zone or (2) a female-calf pair is observed within the 120-dB re 1  $\mu$ Pa zone;
- require Shell to calculate the size of the Level A and B harassment zones for the ice gouge survey, using the 120-dB re 1  $\mu$ Pa isopleth for the shallow penetration sub-bottom profiler as the basis for determining the distance to the Level B disturbance zone;
- require Shell to deploy a sufficient number of trained and experienced, Service-approved vessel-based observers on the ice gouge survey vessel to ensure adequate monitoring of the Level A and B harassment zones during daylight hours throughout the entire survey period;
- require Shell to monitor for marine mammals 30 minutes before, during, and 30 minutes after survey operations and other activities have ceased; and
- encourage Shell to deploy additional protected species observers to 1) increase the probability of detecting all marine mammals in or approaching the Level A and B harassment zones and 2) assist in the collection of data on activities, behaviors, and movements of marine mammals around the source.

## **RATIONALE**

Shell has proposed to conduct an ice gouge survey, a site clearance and shallow hazards survey, and equipment maintenance and recovery in the Alaskan Chukchi Sea during the 2013 Arctic open-water season between 1 July and 31 October. The ice gouge survey would cover approximately 1,000 km of tracklines using dual-frequency side scan sonar, single- and multi-beam bathymetric sonar (echosounder), shallow sub-bottom profiler, and ultra-short baseline acoustic positioning system sound sources. The site clearance and shallow hazards surveys would cover approximately 3,200 km of tracklines using the same sound sources as the ice gouge survey as well as a 40-in<sup>3</sup> airgun array for medium and deep penetration of the seafloor. Both surveys would use a single source vessel. The equipment recovery and maintenance would be conducted at the Burger A wellhead site using a second vessel with a dynamic positioning system. A third vessel may be used for logistics support.

The Service's preliminary determination is that the proposed activities could result in a temporary modification in the behavior of small numbers of up to 13 species of marine mammals, but that the total taking would have a negligible impact on the affected species or stocks. The Service does not anticipate any take of marine mammals by death or serious injury. The Service also believes that the potential for temporary or permanent hearing impairment from Shell's activities would be at the least practicable level because of the proposed mitigation and monitoring measures. Those measures include—

- (1) conducting in-situ sound source and sound propagation measurements for the airgun array (including the full array and the single airgun used during power-down procedures), other marine survey equipment, and the dynamic positioning system;
- (2) adjusting the respective exclusion zone for the airgun array (Level A harassment thresholds of 190 dB re 1  $\mu$ Pa for pinnipeds and 180 dB re 1  $\mu$ Pa for cetaceans), the disturbance zone for the airgun array (Level B harassment threshold of 160 dB re 1  $\mu$ Pa for all marine mammals), and the disturbance zone for the dynamic positioning system (Level B harassment threshold of 120 dB re 1  $\mu$ Pa for all marine mammals), as necessary;
- (3) using trained and experienced, Service-approved vessel-based observers on the survey vessel when using the airgun array and on the equipment recovery and maintenance vessel to monitor the exclusion and disturbance zones during daylight hours throughout the entire survey period;
- (4) using ramp-up, power-down, and shut-down procedures;
- (5) not commencing ramp-up from a full shutdown at night or in periods of poor visibility, if the entire exclusion zone is not visible;
- (6) firing a single airgun approximately once per minute and not longer than three hours during turns or brief transits (to avoid implementation of ramp-up procedures);
- (7) avoiding concentrations or groups of whales when operating vessels;
- (8) when whales are within 274 m, (a) reducing vessel speed to less than 5 knots, (b) steering around whales, (c) not operating vessels in a way that separates members of a group, (d) avoiding multiple changes in vessel direction and speed, and (e) checking the waters immediately adjacent to a vessel for whales before engaging the propellers;
- (9) reducing vessel speed when weather conditions or darkness diminish visibility;
- (10) limiting aircraft overflights to an altitude of 305 m or higher when groups of whales are within 0.5 km of the aircraft;
- (11) restricting aircraft hovering or circling above or within 0.5 km of groups of whales;
- (12) reporting injured and dead marine mammals to the Service and local stranding network using the Service's phased approach and suspending activities, if appropriate; and
- (13) submitting field and technical reports and a final comprehensive report to the Service.

These measures were listed in the draft incidental harassment authorization included at the end of the *Federal Register* notice and are assumed to be those that would be required by the final authorization. However, some of the measures outlined differ from those described in the main body of the *Federal Register* notice, leading to confusion as to which measures will apply. The Marine Mammal Commission recommends that the National Marine Fisheries Service continue to include proposed incidental harassment authorization language at the end of future *Federal Register* notices but ensure that the language is consistent with that referenced in the main body of the corresponding notice.

### **Availability of marine mammals for subsistence**

For the proposed survey, Shell intends to sign a conflict avoidance agreement with the Alaska Eskimo Whaling Commission and the Whaling Captains' Associations of 11 North Slope communities. Shell also plans to meet with affected subsistence communities, stakeholders, and federal agencies to develop and implement a plan of cooperation. Mitigation measures identified in the agreement and the plan are intended to minimize impacts to Alaska Natives who hunt bowhead whales for subsistence purposes. Based on the project design and the timing and location of the

proposed activities and mitigation measures, the Service's preliminary determination is that the proposed taking would not have an unmitigable adverse impact on the availability of marine mammals for subsistence use by Alaska Natives.

However, a determination of "no unmitigable adverse impact" on the availability of marine mammals for subsistence uses should be based, in part, on concurrence of those people who are the experts regarding the availability of marine mammals for subsistence hunts—the Alaska Native hunters themselves. The Commission commends the Service for encouraging Shell to sign a conflict avoidance agreement in support of its 2013 activities in the Chukchi Sea. However, that agreement should be expanded as appropriate to include Native Alaskan hunters from all Arctic communities that take marine mammals for subsistence, and include all marine mammals that might be affected by Shell's survey operations. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service encourage the development of a conflict avoidance agreement for Shell's proposed activities that involves all potentially affected communities and co-management organizations and that accounts for potential adverse impacts on all marine mammal species taken for subsistence purposes including, but not limited to, the bowhead whale.

#### **Estimated takes during the ice gouge survey**

Shell has estimated the numbers of Level B harassment takes associated with the proposed site clearance and shallow hazards survey and equipment maintenance and recovery. However, it did not estimate takes associated with the ice gouge survey. The ice gouge survey would use a variety of sound sources that have the potential to result in Level B harassment, including side scan sonar, single- and multi-beam echosounders, shallow sub-bottom profiler, and ultra-short baseline acoustic positioning system. In its application, Shell considered the potential for harassment from those sources but concluded that the sound level and characteristics of those sources would not result in Level B harassment takes. The Service apparently agreed with that assessment since it did not propose Level B harassment takes for the ice gouge survey.

The Commission disagrees and believes that such sources could result in Level B takes. On several occasions the Service has determined that the sound sources proposed for use during ice gouge surveys are within the hearing range of marine mammals and have the potential to cause Level B harassment. For example, the Service recently issued an incidental harassment authorization to Cape Wind Associates for the use of a single-beam depth sounder, multibeam depth sounder, side scan sonar, magnetometer, shallow-penetration sub-bottom profiler, and medium-penetration sub-bottom profiler to conduct site assessment surveys for renewable energy development off Nantucket Island (78 Fed. Reg. 19217). Those sources are generally the same as those being proposed for use by Shell for its ice gouge survey. In addition, the Service is considering rulemaking to authorize Level B harassment takes for the use of high-frequency sound sources (single-beam and multibeam echosounders and side-scan sonar) to conduct hydrographic surveys (78 Fed. Reg. 1205) and for hydrographic, oceanographic, and meteorological sampling associated with fisheries research activities (78 Fed. Reg. 25703). To ensure that take estimates consider all proposed sound sources with the potential to take marine mammals by Level B harassment, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to revise its take estimates to include Level B harassment takes associated with its ice gouge survey.

Although Shell did not propose takes by Level B harassment for its proposed ice gouge survey, it did provide information on the estimated distance to the 160-dB re 1  $\mu$ Pa isopleth for all ice gouge survey sources (Table 6-4 of its application). Shell estimated the in-beam and out-of-beam distances to the 160-dB re 1  $\mu$ Pa isopleth for the shallow penetration sub-bottom profiler as 30 m and 3 m, respectively. However, no information was provided on the distance to the 120-dB re 1  $\mu$ Pa isopleth, which the Commission believes is a more appropriate threshold for non-impulsive intermittent sound sources.

The Service has categorized sound sources as either impulsive or continuous when determining acoustic criteria and thresholds for Level B harassment (70 Fed. Reg. 1871). However, the Service's guidance does not currently address the appropriate acoustic threshold for non-impulsive intermittent sound sources. As discussed in previous letters to the Service regarding shallow penetration sub-bottom profilers, echosounders, and sonars, those sources have temporal and spectral characteristics that suggest a lower threshold would be more precautionary. The Commission's 20 May 2013 letter on the proposed rulemaking to authorize the Southwest Fisheries Science Center's fisheries research activities (see enclosure) outlines the reasons in significant detail. Until such time as the Service includes non-impulsive, intermittent sounds in its revised acoustic criteria and thresholds, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to 1) estimate the numbers of marine mammals taken during the ice gouge survey and 2) base that estimate on the 120-dB re 1  $\mu$ Pa threshold rather than the 160-dB re 1  $\mu$ Pa threshold. The Marine Mammal Commission further recommends that the Service consult with experts in the field of sound propagation and marine mammal hearing to revise the acoustic criteria and thresholds as necessary to specify threshold levels that would be more appropriate for a wider range of sound sources, including shallow penetration sub-bottom profilers, echosounders, and side-scan sonar.

### **Use of maximum densities in estimating takes**

The Commission has commented on several occasions that the Service is inconsistent in its use of average versus maximum densities to estimate takes and does not provide sufficient assurance that the total potential taking has no more than a negligible impact on the affected stocks. For that reason, the use of average densities does not represent a precautionary approach, especially considering uncertainties in the density and abundance for all marine mammal species in the Chukchi Sea and increasing inter-annual variability in environmental conditions in a changing Arctic.

There are considerable uncertainties associated with Shell's density estimates. Some estimates are based on outdated or incomplete information (e.g., spotted seal, bearded seal), while others may not represent with sufficient confidence the spatial and/or temporal parameters associated with the proposed activities (e.g., harbor porpoise, narwhal, and ribbon seals). The density estimates also cannot fully reflect the inter-annual variations in ice cover, sea surface temperature, and other environmental conditions in the Chukchi Sea in recent open-water seasons (Weingartner et al. 2013), which challenge basic assumptions regarding marine mammal movements and abundance in the project area. Given the uncertainties in the data and variations in environmental conditions in the Chukchi Sea, the Commission believes that the use of maximum densities rather than average densities is a more precautionary approach for estimating takes.

Shell included both maximum and average densities for all species in its application. However, in estimating expected takes by Level B harassment, the Service chose to use average rather than maximum densities for several cetacean species (bowhead whales, gray whales, and harbor porpoises) and for all pinniped species. This was done despite the assertion in Table 4 of the *Federal Register* notice that the take estimates represent “the possible maximum numbers of marine mammals taken by Level B harassment.”

Given uncertainties in the estimation process and the need to ensure no more than a negligible impact on marine mammals in the survey area, the Marine Mammal Commission recommends that the National Marine Fisheries Service use species-specific maximum density estimates as a basis for estimating the expected numbers of takes.

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

#### *Sound source verification*

In its application, Shell indicated that it would conduct in-situ sound source and sound propagation measurements for the airgun array (including the full array and the single source used during power-down procedures), other marine survey equipment, and the dynamic positioning system. The Commission commends this approach, as verification of the source level and associated sound propagation is necessary to determine with more confidence the size of the exclusion and disturbance zones. This is particularly important for the ice gouge survey, which would be conducted in relatively shallow nearshore waters where propagation models are of limited utility. Because bottom topography is so influential in these cases, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to conduct sound source verification for the ice gouge survey at varying depths.

It is not clear when Shell is required to report the results of the in-situ sound propagation measurements to the Service. In section 7(e)(i)(B) of the proposed authorization, the Service states that the test results shall be reported within five days, and in section 9(a) the Service states the results shall be reported within 14 days. The Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to report the preliminary results of its in-situ sound source and sound propagation measurements within five days.

Accurate characterization of the sizes of the exclusion and disturbance zones is critical for estimating and limiting the numbers of takes. In the past, the Commission has recommended a rapid turnaround of the in-situ sound source verification analysis in order to ensure that exclusion zones are the appropriate size. However, in at least one instance rapid turnaround has resulted in errors, as occurred with ION’s measurements of source levels during its 2012 in-ice survey. In that case, the size of the Level B harassment zone was decreased from that modeled, based on erroneous field-report results. The error was not discovered until the end of the field season, when it was determined that the in-season adjustments resulted in unauthorized Level A harassment takes of bowhead whales. Since the purpose of verification is to ensure protection of marine mammals, one way to reduce risk to marine mammals would be to only allow expansion of the exclusion and/or disturbance zones. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service only authorize an in-season adjustment in the size of the exclusion and/or disturbance zones if the size(s) of the estimated zones are determined to be inadequate.

*Mitigation measures for aggregations of whales and female-calf pairs*

The Service has required oil and gas operators to implement measures to ensure that aggregations of bowhead whales engaged in feeding or socializing are protected from disturbance from seismic activities in other incidental harassment authorizations in the Arctic (e.g., 77 Fed. Reg. 40007). Similar protections would be warranted for gray whales, which are also expected to be in the survey area in large numbers during summer and fall. To that end, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to not initiate or continue seismic activities if (1) 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 the 160-dB re 1  $\mu$ Pa zone or (2) a female-calf pair is observed within the 120-dB re 1  $\mu$ Pa zone.

*Monitoring of the ice gouge survey*

As noted above, the Commission believes the Service should have considered potential takes by Level B harassment from the ice gouge survey. To monitor takes during the survey, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to calculate the size of the Level A and B harassment zones for the ice gouge survey, using the 120-dB re 1  $\mu$ Pa isopleth for the shallow penetration sub-bottom profiler as the basis for determining the distance to the Level B disturbance zone. The Marine Mammal Commission further recommends that the National Marine Fisheries Service require Shell to deploy a sufficient number of trained and experienced, Service-approved vessel-based observers on the ice gouge survey vessel to ensure adequate monitoring of the Level A and B harassment zones during daylight hours throughout the entire survey period.

*Monitoring after survey operations*

The Service proposed that Shell monitor for marine mammals 30 minutes before and during survey operations and other activities. No post-activity monitoring would be required. However, post-activity monitoring is needed to ensure that marine mammals are not taken in unexpected or unauthorized ways or in unanticipated numbers. Some types of taking (e.g., taking by death or serious injury) may not be observed until after the activity has ceased. Post-activity monitoring is the best way, and in some situations may be the only reliable way, to detect certain impacts. Accordingly, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to monitor for marine mammals 30 minutes before, during, and 30 minutes after survey operations and other activities have ceased.

*Enhanced monitoring to detect marine mammals and document behavioral responses*

The overall objective of monitoring should be to provide reliable, statistically robust estimates of the marine mammals in the project area, data on their distribution and movement patterns, and evidence sufficient to determine if and how project activities affect their presence, distribution, and movements. An increased number of observers on duty on the source vessels and other project-related vessels would increase the probability of seeing marine mammals in the area. Additional observers could also assist in the collection of data on activities, behavior, and movements of marine mammals in the exclusion and disturbance zone. Behavioral response information is critical for

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understanding the effect of acoustic activities on various marine mammal species, particularly the high frequency sources proposed for use by Shell. The Marine Mammal Commission recommends that the National Marine Fisheries Service encourage Shell to deploy additional protected species observers to 1) increase the probability of detecting all marine mammals in or approaching the Level A and B harassment zones and 2) assist in the collection of data on activities, behaviors, and movements of marine mammals around the source.

We appreciate the opportunity to review this incidental harassment authorization. Please contact me if you have questions regarding these recommendations.

Sincerely,

A handwritten signature in blue ink that reads "Rebecca J. Lent". The signature is written in a cursive style with a large initial "R".

Rebecca J. Lent, Ph.D.  
Executive Director

Cc: Jon Kurland, National Marine Fisheries Service Alaska Regional Office

Enclosure

#### **References**

Weingartner, T. E. Dobbins, S. Danielson, P. Winsor, R. Potter, and H. Statscewich. 2013. Hydrographic variability over the northeastern Chukchi Sea shelf in summer-fall 2008–2010. Continental Shelf Research, <http://dx.doi.org/10.1016/j.csr.2013.03.012i>.