Dated: May 18, 2011.

P. Michael Payne,

Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2011–12764 Filed 5–23–11; 8:45 am]

BILLING CODE 3510–22–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA432

Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Coral and Coral Reefs Off the Southern Atlantic States; Exempted Fishing Permit

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of receipt of an application for an exempted fishing permit; request for comments.

SUMMARY: NMFS announces the receipt of an application for an exempted fishing permit (EFP) from Mr. Don DeMaria. If granted, the EFP would authorize the applicant, with certain conditions, to collect and retain limited numbers of gorgonian corals from the exclusive economic zone (EEZ), off Port Canaveral, FL, north to the North Carolina/Virginia border. The specimens would be used to support research efforts towards a grant awarded to the National Cancer Institute to screen marine invertebrates for possible anti-cancer compounds.

DATES: Comments must be received no later than 5 p.m., eastern time, on June 23, 2011.

ADDRESSES: You may submit comments on the application by either of the following methods:

- *E-mail: Nikhil.Mehta@noaa.gov.* Include in the subject line of the e-mail comment the following document identifier: "*DonDeMaria_EFP 2011*".
- *Mail:* Nikhil Mehta, Southeast Regional Office, NMFS, 263 13th Avenue South, St. Petersburg, FL 33701.

The application and related documents are available for review upon written request to any of the above addresses.

FOR FURTHER INFORMATION CONTACT: Nikhil Mehta, 727–824–5305; *e-mail: Nikhil.Mehta@noaa.gov.*

SUPPLEMENTARY INFORMATION: The EFP is requested under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C 1801 *et seq.*), and regulations at 50 CFR 600.745(b) concerning exempted fishing.

This action involves activities covered by regulations implementing the Fishery Management Plan for Coral, Coral Reefs, and Live/Hardbottom Habitat of the South Atlantic Region. The applicant has requested authorization to collect a maximum of 11 lb (5 kg) of gorgonian corals belonging to the Genus *Thesea* per year. Specimens would be collected in Federal waters off Port Canaveral, FL, north to the North Carolina/Virginia border. The project proposes to use SCUBA gear to make the collections. Samples would be collected from July 1, 2011 to July 31, 2014.

The overall intent of the project is to support research efforts to screen marine invertebrates for possible anti-cancer compounds. The research is part of a contract (No. HHSN261200900012C) between the National Cancer Institute (*http://www.cancer.gov/*) and the Coral Reef Research Foundation (CRRF, *http://www.coralreefresearchfoundation.org/*). Samples would be collected by Mr. DeMaria, who is a sub-contractor for CRRF.

NMFS finds this application warrants further consideration. Based on a preliminary review, NMFS intends to issue the requested EFP, pending receipt of public comments, as per 50 CFR 600.745(b)(3)(i). Possible conditions the agency may impose on this permit, if it is indeed granted, include but are not limited to, a prohibition on conducting research within marine protected areas, marine sanctuaries, special management zones, or artificial reefs without additional authorization. A report on the project findings is due at the end of the collection period, to be submitted to NMFS and reviewed by the South Atlantic Fishery Management Council.

A final decision on issuance of the EFP will depend on NMFS's review of public comments received on the application, consultations with the affected state, the South Atlantic Fishery Management Council, and the U.S. Coast Guard, as well as a determination that it is consistent with all applicable laws.

Authority: 16 U.S.C 1801 *et seq.*

Dated: May 19, 2011.

Margo Schulze-Haugen,

Acting Director, Office of Sustainable Fisheries, National Marine Fisheries Service.

[FR Doc. 2011–12767 Filed 5–23–11; 8:45 am]

BILLING CODE 3510–22–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA396

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Shallow Hazards Survey in the Chukchi Sea, Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS received an application from Statoil USA E&P Inc. (Statoil) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to a proposed open water shallow hazards survey in the Chukchi Sea, Alaska, between July through November 2011. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to Statoil to take, by Level B harassment only, thirteen species of marine mammals during the specified activity.

DATES: Comments and information must be received no later than June 23, 2011.

ADDRESSES: Comments on the application should be addressed to Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. The mailbox address for providing e-mail comments is *ITA.Guan@noaa.gov.* NMFS is not responsible for e-mail comments sent to addresses other than the one provided here. Comments sent via e-mail, including all attachments, must not exceed a 10-megabyte file size.

Instructions: All comments received are a part of the public record and will generally be posted to *http://www.nmfs.noaa.gov/pr/permits/incidental.htm* without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

A copy of the application used in this document may be obtained by writing to the address specified above, telephoning the contact listed below (see **FOR**

FURTHER INFORMATION CONTACT), or visiting the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Shane Guan, Office of Protected Resources, NMFS, (301) 713–2289, ext 137.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "* * * an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization.

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as:

> any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild ["Level A harassment"]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering ["Level B harassment"].

Summary of Request

NMFS received an application on March 1, 2011, from Statoil for the taking, by harassment, of marine mammals incidental to shallow hazards site surveys and soil investigations (geotechnical boreholes) in the Chukchi Sea, Alaska, during the 2011 open-water season. After addressing comments from NMFS, Statoil modified its application and submitted a revised application on April 19, 2011. The April 19, 2011, application is the one available for public comment (see **ADDRESSES**) and considered by NMFS for this proposed IHA.

The proposed shallow hazards and site clearance surveys would use a towed airgun cluster consisting of four, 10-in^3 airguns with a ~600 m towed hydrophone streamer, as well as additional lower-powered and higher frequency survey equipment for collecting bathymetric and shallow sub-bottom data. The proposed survey will take place on and near Statoil's leases in the Chukchi Sea, covering a total area of ~665 km^2 located ~240 km (150 mi) west of Barrow and ~165 km (103 mi) northwest of Wainwright, in water depths of ~30–50 m (100–165 ft).

The proposed geotechnical soil investigations will take place at prospective drilling locations on Statoil's leases and leases jointly owned with ConocoPhillips Alaska Inc. (CPAI). All cores will be either 2.1 in. or 2.8 in. in diameter (depending on soil type) and those collected at prospective drilling locations will be up to 100 m in depth. The maximum total number of samples collected as part of the drilling location and site survey program will be ~29.

Statoil intends to conduct these marine surveys during the 2011 Arctic open-water season (July through November). Impacts to marine mammals may occur from noise produced from active acoustic sources (including airguns) used in the surveys.

Description of the Specified Activity

Statoil acquired 16 leases in the Chukchi Sea during Lease Sale 193 held in February 2008. The leased areas are located ~240 km (150 mi) west of Barrow and ~160 km (~100 mi) northwest of Wainwright. During the open-water season of 2010, Statoil conducted a 3D seismic survey over its lease holdings and the surrounding area. The data gathered during that survey are currently being analyzed in order to determine potential well locations on the leases. These analyses will be completed prior to commencement of the site survey program. During the open-water season of 2011, Statoil proposes to conduct shallow hazards and site clearance surveys (site surveys) and soil investigations (geotechnical boreholes).

The proposed operations will be performed from two different vessels. Shallow hazards surveys will be conducted from the M/V *Duke,* while geotechnical soil investigations will be conducted from the M/V *Fugro Synergy* (see Statoil's application for vessel specifications). Both vessels will mobilize from Dutch Harbor in late July and arrive in the Chukchi Sea to begin work on or after 1 August. Allowing for poor weather days, operations are expected to continue into late September or early October. However, if weather permits and all planned activities have not been completed, operations may continue as late as 15 November.

The site survey work on Statoil's leases will require approximately 23 days to complete. Geotechnical soil investigations on Statoil leases and on leases jointly held with CPAI will require ~14 days of operations.

Shallow Hazards and Site Clearance Surveys

Shallow hazards site surveys are designed to collect bathymetric and shallow sub-seafloor data that allow the evaluation of potential shallow faults, gas zones, and archeological features at prospective exploration drilling locations, as required by the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE). Data are typically collected using multiple types of acoustic equipment. During the site surveys, Statoil proposes to use the following acoustic sources: 4×10 in^3 airgun cluster, single 10 in^3 airgun, Kongsberg SBP3000 sub-bottom profiler, GeoAcoustics 160D side-scan sonar, and a Kongsberg EM2040 multi-beam echosounder. The operating frequencies and estimated source levels of this equipment are provided below.

1. Airguns

A 4×10 in^3 airgun cluster will be used to obtain geological data during the shallow hazards survey. A similar airgun cluster was measured by Shell in 2009 during shallow hazards surveys on their nearby Burger prospect (Reiser *et al.* 2010). The measurements resulted in 90th percentile propagation loss equations of RL =

$218.0 - 17.5\text{LogR} - 0.00061\text{R}$ for a 4×10 in^3 airgun cluster and RL = $204.4 - 16.0\text{LogR} - 0.00082\text{R}$ for a single 10 in^3 airgun (where RL = received level and R = range). The estimated 190, 180, and 160 dB_{rms} re 1 µPa isopleths are estimated at 39 m, 150 m, and 1,800 m from the source. More accurate isopleths at these received levels will be established prior to Statoil's shallow hazards survey (see below).

2. Kongsberg SBP300 Sub-Bottom Profiler

This instrument will be operated from the M/V *Duke* during site survey operations. This sub-bottom profiler operates at frequencies between 2 and 7 kHz with a manufacturer specified source level of ~225 dB re 1 µPa-m. The sound energy is projected downwards from the hull in a maximum 15° cone. However, field measurements of similar instruments in previous years have resulted in much lower actual source levels (range 161–186 dB) than specified by the manufacturers (*i.e.* the manufacturer source level of one instrument was reported as 214 dB, and field measurements resulted in a source level estimate of 186.2 dB) (Reiser *et al.* 2010). Although it is not known whether these field measurements captured the narrow primary beam produced by the instruments, Statoil will measure the sounds produced by this instrument (and all other survey equipment) at the start of operations and if sounds from the instrument are found to be above mitigation threshold levels (180 dB for cetaceans, 190 dB for seals) at a distance beyond the footprint of the vessel, then the same power-down and shut-down mitigation measures used during airgun operations will be employed during use of the sub-bottom profiler.

3. GeoAcoustics 160D Side-Scan Sonar

The side-scan sonar will be operated from the M/V *Duke* during site survey operations. This unit operates at 114 kHz and 410 kHz with a source level of ~233 dB re 1 µPa-m. The sound energy is emitted in a fan shaped pattern that is narrow (0.3–1.0°) in the fore/aft direction of the vessel and broad (40–50°) in the port/starboard direction.

4. Kongsberg EM2040 Multi-Beam Echosounder

Multi-beam echosounders also emit energy in a fan-shaped pattern, similar to the side-scan sonar described above. This unit operates at 200 to 400 kHz with a source level of ~210 dB re 1 µPa-m. The beam width is 1.5° in the fore/aft direction. The multi-beam echosounder will be operated from the M/V *Duke* during site surveys operations.

Geotechnical Soil Investigations

Geotechnical soil investigations are performed to collect detailed data on seafloor sediments and geological structure to a maximum depth of 100 m. These data are then evaluated to help determine the suitability of the site as a drilling location. Statoil has contracted with Fugro who will use the vessel M/V *Fugro Synergy* to complete the planned soil investigations. Three to four bore holes will be collected at each of up to 5 prospective drilling locations on Statoil's leases and up to 3 boreholes may be completed at each of up to 3 potential drilling locations on leases jointly owned with CPAI. This would result in a maximum total of 29 bore holes to be completed as part of the geotechnical soil investigation program. The *Fugro Synergy* operates a Kongsberg EA600 Echosounder and uses a Kongsberg 500 high precision acoustic positioning (HiPAP) system for precise vessel positioning while completing the boreholes. The operating frequencies and estimated source levels of the acoustic equipment, as well as the sounds produced during soil investigation sampling, are provided in the sub-section below.

1. Kongsberg EA600 Echosounder

This echosounder will be operated from the M/V *Fugro Synergy* routinely as a fathometer to provide depth information to the bridge crew. This model is capable of simultaneously using 4 transducers, each with a separate frequency. However, only 2 transducers will be mounted and used during this project. These transducers will operate at 18 kHz and 200 kHz and have similar or slightly lower source levels than the multi-beam echosounder described above. The energy from these transducers is emitted in a conical beam from the hull of the vessel downward to the seafloor.

2. Kongsberg HiPAP 500

The Kongsberg high precision acoustic positioning system (HiPAP) 500 is used to aid the positioning of the M/V *Fugro Synergy* during soil investigation operations. An acoustic signal is sent and received by a transponder on the hull of the vessel and a transponder lowered to the seafloor near the borehole location. The two transponders communicated via signals with a frequency of between 21–30.5 kHz with source levels expected to be in the 200–210 dB range.

3. Geotechnical Soil Investigation Sounds

In-water sounds produced during soil investigation operations by the M/V *Fugro Synergy* have not previously been measured and estimates of such activities vary. Measurements of another Fugro vessel that often conducts soil investigations were made in the Gulf of Mexico in 2009. However, because measurements were taken using a towed hydrophone system, recordings of soil investigation related sounds could not be made while the vessel was stationary. Therefore, sounds recorded while the vessel was in transit were compared to sounds recorded while the vessel also operated generators and mechanical equipment associated with soil investigation operations while in transit. The difference in sound levels during transit alone and during transit with soil investigation equipment operating was negligible and this was attributed to the fact that transit noise was dominant up to at least 7 kHz and likely masked the lower frequency sounds produced by the simulated soil investigation activities.

4. Dynamic Positioning Sound

During soil investigation operations, the M/V *Fugro Synergy* will remain stationary relative to the seafloor by means of a dynamic positioning (DP) system that automatically controls and coordinates vessel movements using bow and/or stern thrusters as well as the primary propeller(s). The sounds produced by soil investigation equipment are not likely to substantially increase overall source levels beyond those produced by the various thrusters while in DP mode. Measurements of a vessel in DP mode with an active bow thruster were made in the Chukchi Sea in 2010 (Chorney *et al.* 2011). The resulting source level estimate was 175.9 dB_{rms} re 1 µPa-m. Using the transmission loss equation from measurements of a single 60 in^3 airgun on Statoil's lease in 2010 ($RL = 205.6 - 13.9\text{LogR} - 0.00093\text{R}$; O'Neill *et al.* 2011) and replacing the constant term with the 175.9 results in an estimated range of 4.97 km to the 120 dB level. To allow for uncertainties and some additional sound energy being contributed by the operating soil investigation equipment, an inflation factor of 1.5 was applied to arrive at an estimated ≥ 120 dB radius of 7.5 km for soil investigation activities.

Description of Marine Mammals in the Area of the Specified Activity

Nine cetacean and four seal species could occur in the general area of the

site clearance and shallow hazards survey. The marine mammal species under NMFS's jurisdiction most likely to occur near operations in the Chukchi and Beaufort seas include four cetacean species: Beluga whale (*Delphinapterus leucas*), bowhead whale (*Balaena mysticetus*), gray whale (*Eschrichtius robustus*), and harbor porpoise (*Phocoena phocoena*), and three seal species: ringed (*Phoca hispida*), spotted (*P. largha*), and bearded seals (*Erignathus barbatus*). The marine mammal species that is likely to be encountered most widely (in space and time) throughout the period of the planned site clearance and shallow hazards surveys is the ringed seal.

Other marine mammal species that have been observed in the Chukchi Sea but are less frequent or uncommon in the project area include narwhal (*Monodon monoceros*), killer whale (*Orcinus orca*), fin whale (*Balaenoptera physalus*), minke whale (*B. acutorostrata*), humpback whale (*Megaptera novaeangliae*), and ribbon seal (*Histriophoca fasciata*). These species could occur in the project area, but each of these species is uncommon or rare in the area and relatively few encounters with these species are expected during the proposed shallow hazards survey. The narwhal occurs in Canadian waters and occasionally in the Beaufort Sea, but it is rare there and is not expected to be encountered. There are scattered records of narwhal in Alaskan waters, including reports by subsistence hunters, where the species is considered extralimital (Reeves *et al.* 2002).

The bowhead, fin, and humpback whales are listed as "endangered" under the Endangered Species Act (ESA) and as depleted under the MMPA. Certain stocks or populations of gray, beluga, and killer whales and spotted seals are listed as endangered or proposed for listing under the ESA; however, none of those stocks or populations occur in the proposed activity area. Additionally, the ribbon seal is considered a "species of concern" under the ESA, and the bearded and ringed seals are "candidate species" under the ESA, meaning they are currently being considered for listing.

Statoil's application contains information on the status, distribution, seasonal distribution, and abundance of each of the species under NMFS jurisdiction mentioned in this document. Please refer to the application for that information (see **ADDRESSES**). Additional information can also be found in the NMFS Stock Assessment Reports (SAR). The Alaska 2010 SAR is available at: *http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2010.pdf.*

Potential Effects of the Specified Activity on Marine Mammals

Operating active acoustic sources such as an airgun array has the potential for adverse effects on marine mammals.

Potential Effects of Airgun Sounds on Marine Mammals

The effects of sounds from airgun pulses might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and temporary or permanent hearing impairment or non-auditory effects (Richardson *et al.* 1995). As outlined in previous NMFS documents, the effects of noise on marine mammals are highly variable, and can be categorized as follows (based on Richardson *et al.* 1995):

(1) Tolerance

Numerous studies have shown that pulsed sounds from airguns are often readily detectable in the water at distances of many kilometers. Numerous studies have also shown that marine mammals at distances more than a few kilometers from operating survey vessels often show no apparent response. That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to airgun pulses under some conditions, at other times, mammals of all three types have shown no overt reactions. In general, pinnipeds and small odontocetes seem to be more tolerant of exposure to airgun pulses than baleen whales.

(2) Behavioral Disturbance

Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (*e.g.,* pinnipeds flushing into water from haulouts or rookeries).

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be expected to be biologically significant if the change affects growth, survival, and reproduction. Some of these significant behavioral modifications include:

- Drastic change in diving/surfacing patterns (such as those thought to be causing beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cease feeding or social interaction.

For example, at the Guerreo Negro Lagoon in Baja California, Mexico, which is one of the important breeding grounds for Pacific gray whales, shipping and dredging associated with a salt works may have induced gray whales to abandon the area through most of the 1960s (Bryant *et al.* 1984). After these activities stopped, the lagoon was reoccupied, first by single whales and later by cow-calf pairs.

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Southall *et al.* 2007).

Currently NMFS uses 160 dB re 1 μPa at received level for impulse noises (such as airgun pulses) as the onset of marine mammal behavioral harassment.

(3) Masking

Chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Since marine mammals depend on acoustic cues for vital biological functions, such as orientation, communication, finding prey, and avoiding predators, marine mammals that experience severe acoustic masking will have reduced fitness in survival and reproduction.

Masking occurs when noise and signals (that the animal utilizes) overlap at both spectral and temporal scales. For the airgun noise generated from the proposed site clearance and shallow hazards surveys, noise will consist of low frequency (under 1 kHz) pulses with extremely short durations (in the scale of milliseconds). Lower frequency man-made noises are more likely to affect detection of communication calls and other potentially important natural

sounds such as surf and prey noise. There is little concern regarding masking near the noise source due to the brief duration of these pulses and relatively longer silence between airgun shots (9–12 seconds). However, at long distances (over tens of kilometers away), due to multipath propagation and reverberation, the durations of airgun pulses can be "stretched" to seconds with long decays (Madsen *et al.* 2006). Therefore it could affect communication signals used by low frequency mysticetes when they occur near the noise band and thus reduce the communication space of animals (e.g., Clark *et al.* 2009) and cause increased stress levels (e.g., Foote *et al.* 2004; Holt *et al.* 2009). Nevertheless, the intensity of the noise is also greatly reduced at such long distances (for example, the modeled received level drops below 120 dB re 1 μPa rms at 14,900 m from the source).

Marine mammals are thought to be able to compensate for masking by adjusting their acoustic behavior such as shifting call frequencies, increasing call volume and vocalization rates. For example, blue whales are found to increase call rates when exposed to seismic survey noise in the St. Lawrence Estuary (Di Iorio and Clark 2010). The North Atlantic right whales (*Eubalaena glacialis*) exposed to high shipping noise increase call frequency (Parks *et al.* 2007), while some humpback whales respond to low-frequency active sonar playbacks by increasing song length (Miller *el al.* 2000).

(4) Hearing Impairment

Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al.* 1999; Schlundt *et al.* 2000; Finneran *et al.* 2002; 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is unrecoverable, or temporary (TTS), in which case the animal's hearing threshold will recover over time (Southall *et al.* 2007). Just like masking, marine mammals that suffer from PTS or TTS will have reduced fitness in survival and reproduction, either permanently or temporarily. Repeated noise exposure that leads to TTS could cause PTS. For transient sounds, the sound level necessary to cause TTS is inversely related to the duration of the sound.

Experiments on a bottlenose dolphin (*Tursiops truncates*) and beluga whale showed that exposure to a single watergun impulse at a received level of 207 kPa (or 30 psi) peak-to-peak (p-p), which is equivalent to 228 dB re 1 μPa (p-p), resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within 4 minutes of the exposure (Finneran *et al.* 2002). No TTS was observed in the bottlenose dolphin. Although the source level of pile driving from one hammer strike is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more noise exposure in terms of SEL than from the single watergun impulse (estimated at 188 dB re 1 μPa^2-s) in the aforementioned experiment (Finneran *et al.* 2002).

For baleen whales, there are no data, direct or indirect, on levels or properties of sound that are required to induce TTS. The frequencies to which baleen whales are most sensitive are lower than those to which odontocetes are most sensitive, and natural ambient noise levels at those low frequencies tend to be higher (Urick 1983). As a result, auditory thresholds of baleen whales within their frequency band of best hearing are believed to be higher (less sensitive) than are those of odontocetes at their best frequencies (Clark and Ellison, 2004). From this, it is suspected that received levels causing TTS onset may also be higher in baleen whales. However, no cases of TTS are expected given the small size of the airguns proposed to be used and the strong likelihood that baleen whales (especially migrating bowheads) would avoid the approaching airguns (or vessel) before being exposed to levels high enough for there to be any possibility of TTS.

In pinnipeds, TTS thresholds associated with exposure to brief pulses (single or multiple) of underwater sound have not been measured. Initial evidence from prolonged exposures suggested that some pinnipeds may incur TTS at somewhat lower received levels than do small odontocetes exposed for similar durations (Kastak *et al.* 1999, 2005; Ketten *et al.* 2001). However, more recent indications are that TTS onset in the most sensitive pinniped species studied (harbor seal, which is closely related to the ringed seal) may occur at a similar SEL as in odontocetes (Kastak *et al.,* 2004).

NMFS (1995, 2000) concluded that cetaceans and pinnipeds should not be exposed to pulsed underwater noise at received levels exceeding, respectively, 180 and 190 dB re 1 μPa rms. The established 180- and 190-dB re 1 μPa rms criteria are not considered to be the levels above which TTS might occur. Rather, they are the received levels above which, in the view of a panel of bioacoustics specialists convened by NMFS before TTS measurements for marine mammals started to become available, one could not be certain that there would be no injurious effects, auditory or otherwise, to marine mammals. As summarized above, data that are now available imply that TTS is unlikely to occur unless bow-riding odontocetes are exposed to airgun pulses much stronger than 180 dB re 1 μPa rms (Southall *et al.* 2007).

No cases of TTS are expected as a result of Statoil's proposed activities given the small size of the source, the strong likelihood that baleen whales (especially migrating bowheads) would avoid the approaching airguns (or vessel) before being exposed to levels high enough for there to be any possibility of TTS, and the mitigation measures proposed to be implemented during the survey described later in this document.

There is no empirical evidence that exposure to pulses of airgun sound can cause PTS in any marine mammal, even with large arrays of airguns (see Southall *et al.,* 2007). However, given the possibility that mammals close to an airgun array might incur TTS, there has been further speculation about the possibility that some individuals occurring very close to airguns might incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage in terrestrial mammals. Relationships between TTS and PTS thresholds have not been studied in marine mammals, but are assumed to be similar to those in humans and other terrestrial mammals. That is, PTS might occur at a received sound level magnitudes higher than the level of onset TTS, or by repeated exposure to the levels that cause TTS. Therefore, by means of preventing the onset of TTS, it is highly unlikely that marine mammals could receive sounds strong enough (and over a sufficient duration) to cause permanent hearing impairment during the proposed marine surveys in the Chukchi Sea.

(5) Non-Auditory Physical Effects

Non-auditory physical effects might occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that theoretically might occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, and other types of organ or tissue damage. Some marine mammal species (*i.e.,* beaked whales) may be

especially susceptible to injury and/or stranding when exposed to strong pulsed sounds. However, there is no definitive evidence that any of these effects occur even for marine mammals in close proximity to large arrays of airguns, and beaked whales do not occur in the proposed project area. In addition, marine mammals that show behavioral avoidance of seismic vessels, including most baleen whales, some odontocetes (including belugas), and some pinnipeds, are especially unlikely to incur non-auditory impairment or other physical effects. The small airgun array proposed to be used by Statoil would only have 190 and 180 dB distances of 35 and 125 m (115 and 410 ft), respectively.

Therefore, it is unlikely that such effects would occur during Statoil's proposed surveys given the brief duration of exposure and the planned monitoring and mitigation measures described later in this document.

(6) Stranding and Mortality

Marine mammals close to underwater detonations of high explosive can be killed or severely injured, and the auditory organs are especially susceptible to injury (Ketten *et al.* 1993; Ketten 1995). Airgun pulses are less energetic and their peak amplitudes have slower rise times. To date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to airgun pulses, even in the case of large airgun arrays.

However, in numerous past IHA notices for seismic surveys, commenters have referenced two stranding events allegedly associated with seismic activities, one off Baja California and a second off Brazil. NMFS has addressed this concern several times, and, without new information, does not believe that this issue warrants further discussion. For information relevant to strandings of marine mammals, readers are encouraged to review NMFS' response to comments on this matter found in 69 FR 74905 (December 14, 2004), 71 FR 43112 (July 31, 2006), 71 FR 50027 (August 24, 2006), and 71 FR 49418 (August 23, 2006). In addition, a May–June 2008, stranding of 100–200 melon-headed whales (*Peponocephala electra*) off Madagascar that appears to be associated with seismic surveys is currently under investigation (IWC 2009).

It should be noted that strandings related to sound exposure have not been recorded for marine mammal species in the Beaufort and Chukchi seas. NMFS notes that in the Beaufort Sea, aerial surveys have been conducted by BOEMRE (formerly the Minerals Management Service or MMS) and industry during periods of industrial activity (and by MMS during times with no activity). No strandings or marine mammals in distress have been observed during these surveys and none have been reported by North Slope Borough inhabitants. As a result, NMFS does not expect any marine mammals will incur serious injury or mortality in the Arctic Ocean or strand as a result of the proposed shallow hazards survey.

Potential Effects From Active Sonar Equipment on Marine Mammals

Several active acoustic sources other than the four 10 in^3 airgun have been proposed for Statoil's 2011 open water shallow hazards survey in the Chukchi Sea. The specifications of this sonar equipment (source levels and frequency ranges) are provided above. In general, the potential effects of this equipment on marine mammals are similar to those from the airgun, except the magnitude of the impacts is expected to be much less due to the lower intensity and higher frequencies. Estimated source levels from sonar equipment are discussed above. In some cases, due to the fact that the operating frequencies of some of this equipment (e.g., Multi-beam echosounder: Frequency at 200–400 kHz) are above the hearing ranges of marine mammals, they are not expected to have any impacts to marine mammals.

Vessel Sounds

In addition to the noise generated from seismic airguns and active sonar systems, various types of vessels will be used in the operations, including source vessel and vessel used for geotechnical soil investigations. Sounds from boats and vessels have been reported extensively (Greene and Moore 1995; Blackwell and Greene 2002; 2005; 2006). Numerous measurements of underwater vessel sound have been performed in support of recent industry activity in the Chukchi and Beaufort Seas. Results of these measurements were reported in various 90-day and comprehensive reports since 2007 (e.g., Aerts *et al.* 2008; Hauser *et al.* 2008; Brueggeman 2009; Ireland *et al.* 2009; O'Neill and McCrodan 2011; Chorney *et al.* 2011). For example, Garner and Hannay (2009) estimated sound pressure levels of 100 dB at distances ranging from approximately 1.5 to 2.3 mi (2.4 to 3.7 km) from various types of barges. MacDonald *et al.* (2008) estimated higher underwater SPLs from the seismic vessel *Gilavar* of 120 dB at approximately 13 mi (21 km) from the source, although the sound level was only 150 dB at 85 ft (26 m) from the vessel. Compared to airgun pulses, underwater sound from vessels is generally at relatively low frequencies. However, noise from the vessel during geophysical soil investigation while operating the DP system using thrusters as well as the primary propeller(s) could produce noise levels higher than during normal operation of the vessel. Measurements of a vessel in DP mode with an active bow thruster were made in the Chukchi Sea in 2010 (Chorney *et al.* 2011). The resulting source level estimate was 175.9 dB_{rms} re 1 μPa-m. Noise at this high level is not expected to be emitted continuously. It is emitted intermittently as the pitch is engaged to position the vessel.

The primary sources of sounds from all vessel classes are propeller cavitation, propeller singing, and propulsion or other machinery. Propeller cavitation is usually the dominant noise source for vessels (Ross 1976). Propeller cavitation and singing are produced outside the hull, whereas propulsion or other machinery noise originates inside the hull. There are additional sounds produced by vessel activity, such as pumps, generators, flow noise from water passing over the hull, and bubbles breaking in the wake. Source levels from various vessels would be empirically measured before the start of marine surveys, and during geotechnical soil investigation while operating the DP system.

Anticipated Effects on Habitat

The primary potential impacts to marine mammals and other marine species are associated with elevated sound levels produced by airguns and other active acoustic sources. However, other potential impacts to the surrounding habitat from physical disturbance are also possible.

Potential Impacts on Prey Species

With regard to fish as a prey source for cetaceans and pinnipeds, fish are known to hear and react to sounds and to use sound to communicate (Tavolga *et al.* 1981) and possibly avoid predators (Wilson and Dill 2002). Experiments have shown that fish can sense both the strength and direction of sound (Hawkins 1981). Primary factors determining whether a fish can sense a sound signal, and potentially react to it, are the frequency of the signal and the strength of the signal in relation to the natural background noise level.

The level of sound at which a fish will react or alter its behavior is usually well above the detection level. Fish have been found to react to sounds when the sound level increased to about 20 dB above the detection level of 120

dB (Ona 1988); however, the response threshold can depend on the time of year and the fish's physiological condition (Engas *et al.* 1993). In general, fish react more strongly to pulses of sound rather than a continuous signal (Blaxter *et al.* 1981), and a quicker alarm response is elicited when the sound signal intensity rises rapidly compared to sound rising more slowly to the same level.

Investigations of fish behavior in relation to vessel noise (Olsen *et al.* 1983; Ona 1988; Ona and Godo 1990) have shown that fish react when the sound from the engines and propeller exceeds a certain level. Avoidance reactions have been observed in fish such as cod and herring when vessels approached close enough that received sound levels are 110 dB to 130 dB (Nakken 1992; Olsen 1979; Ona and Godo 1990; Ona and Toresen 1988). However, other researchers have found that fish such as polar cod, herring, and capeline are often attracted to vessels (apparently by the noise) and swim toward the vessel (Rostad *et al.* 2006). Typical sound source levels of vessel noise in the audible range for fish are 150 dB to 170 dB (Richardson *et al.* 1995).

Some mysticetes, including bowhead whales, feed on concentrations of zooplankton. Some feeding bowhead whales may occur in the Alaskan Beaufort Sea in July and August, and others feed intermittently during their westward migration in September and October (Richardson and Thomson [eds.] 2002; Lowry *et al.* 2004). However, by the time most bowhead whales reach the Chukchi Sea (October), they will likely no longer be feeding, or if it occurs it will be very limited. A reaction by zooplankton to a seismic impulse would only be relevant to whales if it caused concentrations of zooplankton to scatter. Pressure changes of sufficient magnitude to cause that type of reaction would probably occur only very close to the source. Impacts on zooplankton behavior are predicted to be negligible, and that would translate into negligible impacts on feeding mysticetes. Thus, the proposed activity is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Proposed Mitigation

In order to issue an incidental take authorization under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses.

For the proposed Statoil open water shallow hazards survey in the Chukchi Sea, Statoil worked with NMFS and proposed the following mitigation measures to minimize the potential impacts to marine mammals in the project vicinity as a result of the shallow hazards survey activities.

As part of the application, Statoil submitted to NMFS a Marine Mammal Monitoring and Mitigation Program (4MP) for its open water shallow hazards survey in the Chukchi Sea during the 2011 open-water season. The objectives of the 4MP are:

- To ensure that disturbance to marine mammals and subsistence hunts is minimized and all permit stipulations are followed,
- To document the effects of the proposed survey activities on marine mammals, and
- To collect baseline data on the occurrence and distribution of marine mammals in the study area.

The 4MP may be modified or supplemented based on comments or new information received from the public during the public comment period or from the peer review panel (see the "Monitoring Plan Peer Review" section later in this document).

Mitigation Measures Proposed in Statoil's IHA Application

For the proposed mitigation measures, Statoil listed the following protocols to be implemented during its shallow hazards survey in the Chukchi Sea.

(1) Sound Source Measurements

As described above, previous measurements of similar airgun arrays in the Chukchi Sea were used to model the distances at which received levels are likely to fall below 120, 160, 180, and 190 dB re 1 µPa (rms) from the planned airgun sources. These modeled distances will be used as temporary safety radii until measurements of the airgun sound source are conducted. The measurements will be made at the beginning of the field season and the measured radii used for the remainder of the survey period.

The objectives of the sound source verification measurements planned for 2011 in the Chukchi Sea will be to measure the distances at which broadband received levels reach 190, 180, 170, 160, and 120 dB_{rms} re 1 µPa for the airgun configurations that may be used during the survey activities. The configurations will include at least the full array (4×10 in^3) and the operation of a single 10 in^3 airgun that will be used during power downs or very shallow penetration surveys. The measurements of airgun sounds will be made by an acoustics contractor at the beginning of the survey. The distances to the various radii will be reported as soon as possible after recovery of the equipment. The primary radii of concern will be the 190 and 180 dB safety radii for pinnipeds and cetaceans, respectively, and the 160 dB disturbance radii. In addition to reporting the radii of specific regulatory concern, nominal distances to other sound isopleths down to 120 dB_{rms} will be reported in increments of 10 dB. Sound levels during soil investigation operations will also be measured. However, source levels are not expected to be strong enough to require mitigation actions at the 190 dB or 180 dB levels.

Data will be previewed in the field immediately after download from the hydrophone instruments. An initial sound source analysis will be supplied to NMFS and the vessel within 120 hours of completion of the measurements, if possible. The report will indicate the distances to sound levels based on fits of empirical transmission loss formulae to data in the endfire and broadside directions. A more detailed report will be issued to NMFS as part of the 90-day report following completion of the acoustic program.

(2) Safety and Disturbance Zones

Under current NMFS guidelines, "safety radii" for marine mammal exposure to impulse sources are customarily defined as the distances within which received sound levels are ≥180 dB_{rms} re 1 µPa for cetaceans and ≥190 dB_{rms} re 1 µPa for pinnipeds. These safety criteria are based on an assumption that SPL received at levels lower than these will not injure these animals or impair their hearing abilities, but that at higher levels might have some such effects. Disturbance or behavioral effects to marine mammals from underwater sound may occur after exposure to sound at distances greater than the safety radii (Richardson *et al.* 1995).

Initial safety and disturbance radii for the sound levels produced by the planned airgun configurations have been estimated (Table 1). These radii will be used for mitigation purposes until results of direct measurements are available early during the exploration activities. The proposed surveys will use an airgun source composed of four

10-in^3 airguns (total discharge volume of 40 in^3) and a single 10 in^3 airgun. Underwater sound propagation from a similar 4 × 10-in^3 airgun cluster and single 10 in^3 was measured in 2009 (Reiser *et al.* 2010). Those measurements resulted in 90th percentile propagation loss equations of RL = 218.0 − 17.5LogR − 0.00061R for the 4 × 10 in^3 airgun cluster and RL = 204.4 − 16.0LogR − 0.00082R for the single 10 in^3 airgun (where RL = received level and R = range). The estimated distances for the proposed 2011 activities are based on a 25% increase over 2009 results (Table 1).

In addition to the site surveys, Statoil plans to use a dedicated vessel to conduct geotechnical soil investigations. Sounds produced by the vessel and soil investigation equipment are not expected to be above 180 dB (rms). Therefore, mitigation related to acoustic impacts from these activities is not expected to be necessary.

An acoustics contractor will perform direct measurements of the received levels of underwater sound versus distance and direction from the airguns and soil investigation vessel using calibrated hydrophones. The acoustic data will be analyzed as quickly as reasonably practicable in the field and used to verify and adjust the safety distances. The field report will be made available to NMFS and the MMOs within 120 hrs of completing the measurements. The mitigation measures to be implemented at the 190 and 180 dB sound levels will include power downs and shut downs as described below.

TABLE 1—DISTANCES TO SPECIFIED RECEIVED LEVELS MEASURED FROM A 4 × 10 IN^3 AIRGUN CLUSTER AND A SINGLE 10-IN^3 AIRGUN ON THE BURGER PROSPECT IN 2009 AS REPORTED BY REISER ET AL. (2010). THE 2011 "PRE-SSV" DISTANCES ARE A PRECAUTIONARY 25% INCREASE ABOVE THE REPORTED 2009 RESULTS AND WILL BE USED BY MMOS FOR MITIGATION PURPOSES UNTIL AN SSV IS COMPLETED IN 2011

Received Levels (dB re 1 μPa rms)	Distance (m)			
	Airgun cluster (4 × 10 in^3)		Single airgun (1 × 10 in^3)	
	2009 Results	2011 pre-SSV	2009 Results	2011 pre-SSV
190	39	50	8	10
180	150	190	34	45
160	1,800	2,250	570	715
120	31,000	39,000	19,000	24,000

(3) Speed and Course Alterations

If a marine mammal is detected outside the applicable safety radius and, based on its position and the relative motion, is likely to enter the safety radius, changes of the vessel's speed and/or direct course will be considered if this does not compromise operational safety. For marine seismic surveys using large streamer arrays, course alterations are not typically possible. However, for the smaller airgun array and streamer planned during the proposed site surveys, such changes may be possible. After any such speed and/or course alteration is begun, the marine mammal activities and movements relative to the survey vessel will be closely monitored to ensure that the marine mammal does not approach within the safety radius. If the mammal appears likely to enter the safety radius, further mitigative actions will be taken, including a power down or shut down of the airgun(s).

(4) Power Downs

A power down for immediate mitigation purposes is the immediate reduction in the number of operating airguns such that the radii of the 190 dB_{rms} and 180 dB_{rms} zones are decreased to the extent that an observed marine mammal(s) are not in the applicable safety zone of the full array. Power downs are also used while the vessel turns from the end of one survey line to the start of the next. During a power down, one airgun (or some other number of airguns less than the full airgun array) continues firing. The continued operation of one airgun is intended to (a) alert marine mammals to the presence of the survey vessel in the area, and (b) retain the option of initiating a ramp up to full operations under poor visibility conditions.

The array will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable safety zone of the full array, but is outside the applicable safety zone of the single mitigation airgun. Likewise, if a mammal is already within the safety zone when first detected, the airguns will be powered down immediately. If a marine mammal is sighted within or about to enter the applicable safety zone of the single mitigation airgun, it too will be shut down (see following section).

Following a power down, operation of the full airgun array will not resume until the marine mammal has cleared the safety zone. The animal will be considered to have cleared the safety zone if it:

- Is visually observed to have left the safety zone of the full array, or
- Has not been seen within the zone for 15 min in the case of pinnipeds or small odontocetes, or
- Has not been seen within the zone for 30 min in the case of mysticetes or large odontocetes.

(5) Shut Downs

The operating airgun(s) will be shut down completely if a marine mammal approaches or enters the then-applicable safety radius and a power down is not practical or adequate to reduce exposure to less than 190 or 180 dB_{rms}, as appropriate. In most cases, this means the mitigation airgun will be shut down completely if a marine mammal approaches or enters the estimated safety radius around the single 10 in^3 airgun while it is operating during a power down. Airgun activity will not resume until the marine mammal has cleared the safety radius. The animal will be considered to have cleared the safety radius as described above under power down procedures.

A shut down of the borehole drilling equipment may be requested by MMOs if an animal is sighted approaching the vessel close enough to potentially interact with and be harmed by the soil investigation operation.

(6) Ramp Ups

A ramp up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of airguns firing until the full volume is achieved. The purpose of a ramp up (or "soft start") is to "warn" cetaceans and pinnipeds in the vicinity of the airguns and to provide the time for them to leave the area and thus avoid any

potential injury or impairment of their hearing abilities.

During the proposed site survey program, the seismic operator will ramp up the airgun cluster slowly. Full ramp ups (i.e., from a cold start after a shut down, when no airguns have been firing) will begin by firing a single airgun in the array. The minimum duration of a shut-down period, i.e., without air guns firing, which must be followed by a ramp up is typically the amount of time it would take the source vessel to cover the 180-dB safety radius. Given the small size of the planned airgun array, it is estimated that period to be about 1–2 minutes based on the modeling results described above and a survey speed of 4 kts.

A full ramp up, after a shut down, will not begin until there has been a minimum of 30 minutes of observation of the safety zone by MMOs to assure that no marine mammals are present. The entire safety zone must be visible during the 30-minute lead-in to a full ramp up. If the entire safety zone is not visible, then ramp up from a cold start cannot begin. If a marine mammal(s) is sighted within the safety zone during the 30-minute watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the safety zone or the animal(s) is not sighted for at least 15–30 minutes: 15 minutes for small odontocetes and pinnipeds, or 30 minutes for baleen whales and large odontocetes.

During turns or brief transits between survey transects, one airgun will continue operating. The ramp-up procedure will still be followed when increasing the source levels from one airgun to the full 4-airgun cluster. However, keeping one airgun firing will avoid the prohibition of a cold start during darkness or other periods of poor visibility. Through use of this approach, survey operations can resume upon entry to a new transect without the 30-minute watch period of the full safety radius required for a cold start. MMOs will be on duty whenever the airguns are firing during daylight, and during the 30-min periods prior to ramp-ups as well as during ramp-ups. Daylight will occur for 24 h/day until mid-August, so until that date MMOs will automatically be observing during the 30-minute period preceding a ramp up. Later in the season, MMOs will be called to duty at night to observe prior to and during any ramp ups. The survey operator and MMOs will maintain records of the times when ramp-ups start, and when the airgun arrays reach full power.

Additional Mitigation Measures Proposed by NMFS

Besides Statoil's proposed mitigation measures discussed above, NMFS proposes the following additional protective measures to address some uncertainties regarding the impacts of bowhead cow-calf pairs and aggregations of whales from shallow hazards surveys. Specifically, NMFS proposes that

- A 160-dB vessel monitoring zone for large whales will be established and monitored in the Chukchi Sea during all shallow hazards surveys. Whenever 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)) are observed during a vessel monitoring program within the 160-dB safety zone around the survey operations, the survey activity will not commence or will shut down, until they are no longer present within the 160-dB safety zone of shallow hazards surveying operations.

Furthermore, NMFS proposes the following measures be included in the IHA, if issued, in order to ensure the least practicable impact on the affected species or stocks:

(1) All vessels should reduce speed when within 300 yards (274 m) of whales, and those vessels capable of steering around such groups should do so. Vessels may not be operated in such a way as to separate members of a group of whales from other members of the group;

(2) Avoid multiple changes in direction and speed when within 300 yards (274 m) of whales; and

(3) When weather conditions require, such as when visibility drops, support vessels must adjust speed (increase or decrease) and direction accordingly to avoid the likelihood of injury to whales.

Mitigation Conclusions

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an ITA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring Measures Proposed in Statoil's IHA Application

The monitoring plan proposed by Statoil can be found in the 4MP. The plan may be modified or supplemented based on comments or new information received from the public during the public comment period or from the peer review panel (see the "Monitoring Plan Peer Review" section later in this document). A summary of the primary components of the plan follows.

(1) Vessel-Based MMOs

Vessel-based monitoring for marine mammals will be done by trained MMOs throughout the period of marine survey activities. MMOs will monitor the occurrence and behavior of marine mammals near the survey vessel during all daylight periods during operation and during most daylight periods when airgun operations are not occurring. MMO duties will include watching for and identifying marine mammals, recording their numbers, distances, and reactions to the survey operations, and documenting "take by harassment" as defined by NMFS.

A sufficient number of MMOs will be required onboard the survey vessel to meet the following criteria: (1) 100% monitoring coverage during all periods of survey operations in daylight; (2) maximum of 4 consecutive hours on watch per MMO; and (3) maximum of

12 hours of watch time per day per MMO.

MMO teams will consist of Inupiat observers and experienced field biologists. An experienced field crew leader will supervise the MMO team onboard the survey vessel. The total number of MMOs may decrease later in the season as the duration of daylight decreases. Statoil currently plans to have 5 MMOs aboard the site survey vessel and 3 MMOs aboard the soil investigation vessel, with the potential of reducing the number of MMOs later in the season as daylight periods decrease in length.

Crew leaders and most other biologists serving as observers in 2011 will be individuals with experience as observers during recent seismic or shallow hazards monitoring projects in Alaska, the Canadian Beaufort, or other offshore areas in recent years.

Observers will complete a two or three-day training session on marine mammal monitoring, to be conducted shortly before the anticipated start of the 2011 open-water season. The training session(s) will be conducted by qualified marine mammalogists with extensive crew-leader experience during previous vessel-based monitoring programs. A marine mammal observers' handbook, adapted for the specifics of the planned survey program will be reviewed as part of the training.

Primary objectives of the training include:

- Review of the marine mammal monitoring plan for this project, including any amendments specified by NMFS in the IHA (if issued), by USFWS or Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), or by other agreements in which Statoil may elect to participate;
- Review of marine mammal sighting, identification, and distance estimation methods;
- Review of operation of specialized equipment (reticle binoculars, night vision devices, and GPS system);
- Review of, and classroom practice with, data recording and data entry systems, including procedures for recording data on marine mammal sightings, monitoring operations, environmental conditions, and entry error control. These procedures will be implemented through use of a customized computer database and laptop computers;
- Review of the specific tasks of the Inupiat Communicator.

The observer(s) will watch for marine mammals from the best available vantage point on the survey vessels, typically the bridge. The observer(s) will scan systematically with the unaided eye and 7×50 reticle binoculars, supplemented with 20×60 image-stabilized Zeiss Binoculars or Fujinon 25×150 "Big-eye" binoculars, and night-vision equipment when needed (see below). Personnel on the bridge will assist the marine mammal observer(s) in watching for marine mammals.

Information to be recorded by marine mammal observers will include the same types of information that were recorded during recent monitoring programs associated with Industry activity in the Arctic (*e.g.,* Ireland *et al.* 2009). When a mammal sighting is made, the following information about the sighting will be recorded:

(A) Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from the MMO, apparent reaction to activities (*e.g.,* none, avoidance, approach, paralleling, *etc.*), closest point of approach, and behavioral pace;

(B) Time, location, speed, activity of the vessel, sea state, ice cover, visibility, and sun glare; and

(C) The positions of other vessel(s) in the vicinity of the MMO location.

The ship's position, speed of support vessels, and water temperature, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.

Monitoring At Night and In Poor Visibility

Night-vision equipment (Generation 3 binocular image intensifiers, or equivalent units) will be available for use when/if needed. Past experience with night-vision devices (NVDs) in the Beaufort and Chukchi seas and elsewhere has indicated that NVDs are not nearly as effective as visual observation during daylight hours (*e.g.,* Harris *et al.* 1997, 1998; Moulton and Lawson 2002).

(2) Acoustic Monitoring

Sound Source Measurements

As described above, previous measurements of airguns in the Chukchi Sea were used to estimate the distances at which received levels are likely to fall below 120, 160, 180, and 190 dB_{rms} from the planned airgun sources. These modeled distances will be used as temporary safety radii until measurements of the airgun sound source are conducted. The measurements will be made at the beginning of the field season and the measured radii used for the remainder of the survey period. An acoustics contractor will use their equipment to record and analyze the underwater sounds and write the summary reports as described below.

The objectives of the sound source verification measurements planned for 2011 in the Chukchi Sea will be (1) to measure the distances at which broadband received levels reach 190, 180, 170, 160, and 120 dB_{rms} re 1 μPa for the airgun configurations that may be used during the survey activities. The configurations will include at least the full array (4×10 in^3) and the operation of a single 10 in^3 airgun that will be used during power downs or very shallow penetration surveys.

2011 Joint Environmental Studies Program

Statoil, Shell Offshore, Inc. (Shell), and ConocoPhillips Alaska Inc. (CPAI) are working on plans to once again jointly fund an extensive environmental studies program in the Chukchi Sea. This program is expected to be coordinated by Olgoonik-Fairweather LLC (OFJV) during the 2011 open water season. The environmental studies program is not part of the Statoil site survey and soil investigations program, but acoustic monitoring equipment is planned to be deployed on and near Statoil leases and will therefore collect additional data on the sounds produced by the 2011 activities. The program components include:

- Acoustics Monitoring
- Fisheries Ecology
- Benthic Ecology
- Plankton Ecology
- Marine Mammal Surveys
- Seabird Surveys, and
- Physical Oceanography.

The planned 2011 program will continue the acoustic monitoring programs carried out in 2006–2010. A similar number of acoustic recorders as deployed in past years will be distributed broadly across the Chukchi lease area and nearshore environment. In past years, clusters of recorders designed to localize marine mammal calls originating within or nearby the clusters have been deployed on each of the companies' prospects: Amundsen (Statoil), Burger (Shell), and Klondike (CPAI). This year, recorders from the clusters are planned to be relocated in a broader deployment on and around Hanna Shoal.

The recorders will be deployed in late July or mid-August and will be retrieved in early to mid-October, depending on ice conditions. The recorders will be AMAR and AURAL model acoustic

buoys set to record at 16 kHz sample rate. These are the same recorder models and same sample rates that have been used for this program from 2006–2010. The broad area arrays are designed to capture both general background soundscape data, industrial sounds and marine mammal call data across the lease area. From previous deployments of these recordings we have been able to gain insight into large-scale distributions of marine mammals, identification of marine mammal species present, movement and migration patterns, and general abundance data.

Monitoring Plan Peer Review

The MMPA requires that monitoring plans be independently peer reviewed "where the proposed activity may affect the availability of a species or stock for taking for subsistence uses" (16 U.S.C. 1371(a)(5)(D)(ii)(III)). Regarding this requirement, NMFS' implementing regulations state, "Upon receipt of a complete monitoring plan, and at its discretion, [NMFS] will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan" (50 CFR 216.108(d)).

NMFS convened an independent peer review panel to review Statoil's mitigation and monitoring plan in its IHA application for taking marine mammals incidental to the proposed shallow hazards survey in the Chukchi Sea, during 2011. The panel met and reviewed the plan in early March 2011, and provided comments to NMFS in April 2011. NMFS is currently reviewing the panel report and will consider all recommendations made by the panel, incorporate appropriate changes into the monitoring requirements of the IHA (if issued) and publish the panel's findings and recommendations in the final IHA notice of issuance or denial document.

Reporting Measures

(1) SSV Report

A report on the preliminary results of the acoustic verification measurements, including as a minimum the measured 190-, 180-, 160-, and 120-dB_{rms} re 1 μPa radii of the source vessel(s) and the support vessels, will be submitted within 120 hr after collection and analysis of those measurements at the start of the field season. This report will specify the distances of the safety zones that were adopted for the marine survey activities.

(2) Field Reports

Statoil states that throughout the survey program, the observers will prepare a report each day or at such other interval as the IHA (if issued), or Statoil may require, summarizing the recent results of the monitoring program. The field reports will summarize the species and numbers of marine mammals sighted. These reports will be provided to NMFS and to the survey operators.

(3) Technical Reports

The results of Statoil's 2011 vessel-based monitoring, including estimates of "take" by harassment, will be presented in the "90-day" and Final Technical reports. Statoil proposes that the Technical Reports will include:

(a) Summaries of monitoring effort (*e.g.,* total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);

(b) Analyses of the effects of various factors influencing detectability of marine mammals (*e.g.,* sea state, number of observers, and fog/glare);

(c) Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;

(d) Analyses of the effects of survey operations;

- Sighting rates of marine mammals during periods with and without airgun activities (and other variables that could affect detectability), such as:
- Initial sighting distances versus airgun activity state;
- Closest point of approach versus airgun activity state;
- Observed behaviors and types of movements versus airgun activity state;
- Numbers of sightings/individuals seen versus airgun activity state;
- Distribution around the survey vessel versus airgun activity state; and
- Estimates of take by harassment.

(4) Comprehensive Report

Following the 2011 open-water season a comprehensive report describing the vessel-based and acoustic monitoring programs will be prepared. The comprehensive report will describe the methods, results, conclusions and limitations of each of the individual data sets in detail. The report will also integrate (to the extent possible) the studies into a broad based assessment of industry activities, and other activities that occur in the Beaufort and/or Chukchi seas, and their impacts on marine mammals during 2011. The report will help to establish long-term data sets that can assist with the evaluation of changes in the Chukchi and Beaufort sea ecosystems. The report will attempt to provide a regional synthesis of available data on industry activity in offshore areas of northern Alaska that may influence marine mammal density, distribution and behavior.

(5) Notification of Injured or Dead Marine Mammals

In addition to the reporting measures proposed by Statoil, NMFS will require that Statoil notify NMFS' Office of Protected Resources and NMFS' Stranding Network within 48 hours of sighting an injured or dead marine mammal in the vicinity of marine survey operations. Statoil shall provide NMFS with the species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In the event that an injured or dead marine mammal is found by Statoil that is not in the vicinity of the proposed open water marine survey program, Statoil will report the same information as listed above as soon as operationally feasible to NMFS.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]. Only take by Level B behavioral harassment is anticipated as a result of the proposed open water marine survey program. Anticipated impacts to marine mammals are associated with noise propagation from the survey airgun(s) used in the shallow hazards survey.

The full suite of potential impacts to marine mammals was described in detail in the "Potential Effects of the Specified Activity on Marine Mammals" section found earlier in this document. The potential effects of sound from the proposed open water marine survey programs might include one or more of the following: Tolerance; masking of

natural sounds; behavioral disturbance; non-auditory physical effects; and, at least in theory, temporary or permanent hearing impairment (Richardson *et al.* 1995). As discussed earlier in this document, the most common impact will likely be from behavioral disturbance, including avoidance of the ensonified area or changes in speed, direction, and/or diving profile of the animal. For reasons discussed previously in this document, hearing impairment (TTS and PTS) are highly unlikely to occur based on the proposed mitigation and monitoring measures that would preclude marine mammals being exposed to noise levels high enough to cause hearing impairment.

For impulse sounds, such as those produced by airgun(s) used in the seismic survey, NMFS uses the 160 dB_{rms} re 1 µPa isopleth to indicate the onset of Level B harassment. For non-impulse sounds, such as noise generated during the geotechnical soil investigation that involves drilling bore holes and running DP thruster of the vessel, NMFS uses the 120 dB_{rms} re 1 µPa isopleth to indicate the onset of Level B harassment. Statoil provided calculations for the 160- and 120-dB isopleths produced by these activities and then used those isopleths to estimate takes by harassment. NMFS used the calculations to make the necessary MMPA preliminary findings. Statoil provided a full description of the methodology used to estimate takes by harassment in its IHA application (see **ADDRESSES**), which is also provided in the following sections.

Statoil has requested an authorization to take 13 marine mammal species by Level B harassment. These 13 marine mammal species are: Beluga whale (*Delphinapterus leucas*), narwhal (*Monodon monoceros*), killer whale (*Orcinus orca*), harbor porpoise (*Phocoena phocoena*), bowhead whale (*Balaena mysticetus*), gray whale (*Eschrichtius robustus*), humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata*), fin whale (*B. physalus*), bearded seal (*Erignathus barbatus*), ringed seal (*Phoca hispida*), spotted seal (*P. largha*), and ribbon seal (*Histriophoca fasciata*).

Basis for Estimating "Take by Harassment"

As stated previously, it is current NMFS policy to estimate take by Level B harassment for impulse sounds at a received level of 160 dB_{rms} re 1µPa. However, not all animals react to sounds at this low level, and many will not show strong reactions (and in some cases any reaction) until sounds are much stronger. Southall *et al.* (2007) provide a severity scale for ranking observed behavioral responses of both free-ranging marine mammals and laboratory subjects to various types of anthropogenic sound (see Table 4 in Southall *et al.* (2007)). Tables 7, 9, and 11 in Southall *et al.* (2007) outline the numbers of low-frequency cetaceans, mid-frequency cetaceans, and pinnipeds in water, respectively, reported as having behavioral responses to multi-pulses in 10-dB received level increments. These tables illustrate that for the studies summarized the more severe reactions did not occur until sounds were much higher than 160 dB_{rms} re 1µPa.

As described earlier in the document, a 4×10 in^3 airgun cluster will be used to obtain geological data during the site surveys. A similar airgun cluster was measured by Shell in 2009 during shallow hazards surveys on their nearby Burger prospect (Reiser *et al.* 2010). The measurements resulted in 90th percentile propagation loss equations of $RL = 218. - 17.5LogR - 0.00061R$ for a 4×10 in^3 airgun cluster and $RL = 204.4 - 16.0LogR - 0.00082R$ for a single 10 in^3 airgun (where RL = received level and R = range). For use in estimating potential harassment takes in this application, as well as for mitigation radii to be implemented by MMOs prior to SSV measurements, ranges to threshold levels from the 2009 measurements were increased by 25% as a precautionary approach (Table 1). The ≥160 dB distance is therefore estimated to be 2.25 km from the source. Adding a 2.25 km perimeter to the two site survey areas results in an estimated area of 1,037 km^2 being exposed to ≥160 dB.

Geotechnical soil investigations on the Statoil leases and leases jointly owned with CPAI will involve completing 3–4 boreholes at up to 8 total prospective drilling locations for an expected maximum of 29 boreholes. The 3–4 boreholes completed at each drilling location will be positioned in a square or triangle formation, roughly 100 m on each side. As described earlier, the sounds produced by soil investigation equipment are estimated to fall below 120 dB at a distance of 7.5 km. Buffering 4 core sites spaced 100 m apart with the 7.5 km 120 dB distance results in a total area of 180 km^2. The total area exposed to sounds ≥120 dB by soil investigations at the 8 prospective drilling locations will therefore be 1,440 km^2.

The following subsections describe the estimated densities of marine mammals that may occur in the areas where activities are planned, and areas of water that may be ensonified by pulsed sounds to ≥ 160 dB or non-pulsed sounds to ≥ 120 dB.

Marine mammal densities near the planned activities in the Chukchi Sea are likely to vary by season, and habitat. Therefore, densities have been derived for two time periods, the summer period, including July and August, and the fall period, including September and October. Animal densities encountered in the Chukchi Sea during both of these time periods will further depend on whether they are occurring in open water or near the ice margin. Vessel and equipment limitations will result in very little activity occurring in or near sea ice, however, if ice is present near the areas of activity some sounds produced by the activities may remain above disturbance threshold levels in ice margin habitats. Therefore, open water densities have been used to estimate potential "take by harassment" in 90% of the area expected to be ensonified above disturbance thresholds while ice margin densities have been used in the remaining 10% of the ensonified area.

Detectability bias [f(0)] is associated with diminishing sightability with increasing lateral distance from the trackline. Availability bias [g(0)] refers to the fact that there is < 100% probability of sighting an animal that is present on the survey trackline. Some sources of densities used below included these correction factors in their reported densities. In other cases the best available correction factors were applied to reported results when they had not been included in the reported analyses (*e.g.* Moore *et al.* 2000).

(1) Cetaceans

Eight species of cetaceans are known to occur in the Chukchi Sea area of the proposed Statoil project. Only four of these (bowhead, beluga, and gray whales, and harbor porpoise) are likely to be encountered during the proposed survey activities. Three of the eight species (bowhead, fin, and humpback whales) are listed as endangered under the ESA. Of these, only the bowhead is likely to be found within the survey area.

Beluga Whales—Summer densities of belugas in offshore waters of the Chukchi Sea are expected to be low, with higher densities in ice-margin and nearshore areas. Aerial surveys have recorded few belugas in the offshore Chukchi Sea during the summer months (Moore *et al.* 2000). Aerial surveys of the Chukchi Sea in 2008–2009 flown by the NMML as part of the Chukchi Offshore Monitoring in Drilling Area project (COMIDA) have only reported 5 beluga

sightings during > 14,000 km of on-transect effort, only 2 of which were offshore (COMIDA 2009). One of the three nearshore sightings was of a large group (~275 individuals on July 12, 2009) of migrating belugas along the coastline just north of Peard Bay. Additionally, only one beluga sighting was recorded during > 61,000 km of visual effort during good visibility conditions from industry vessels operating largely in offshore areas of the Chukchi Sea in September–October of 2006–2008 (Haley *et al.* 2010). If belugas are present during the summer, they are more likely to occur in or near the ice edge or close to shore during their northward migration. Expected densities have previously been calculated from data in Moore *et al.* (2000). However, more recent data from COMIDA aerial surveys during 2008–2010 are now available. Effort and sightings reported by Clarke and Ferguson (in prep.) were used to calculate the average open-water density estimate. Clarke and Ferguson (in prep.) reported two on-transect beluga sightings (5 individuals) during 11,985 km of on-transect effort in waters 36–50 m deep in the Chukchi Sea during July and August. The mean group size of these two sightings is 2.5 animals. A f(0) value of 2.841 and g(0) value of 0.58 from Harwood *et al.* (1996) were also used in the density calculation. Specific data on the relative abundance of beluga whales in open-water versus ice-margin habitats during the summer in the Chukchi Sea are not available. However, belugas are commonly associated with ice, so an inflation factor of 4 was used to estimate the average ice-margin density from the open-water density. Very low densities observed from vessels operating in the Chukchi Sea during non-seismic periods and locations in July–August of 2006–2008 (0.0–0.0001/km^2; Haley *et al.* 2010) also suggest the number of beluga whales likely to be present near the planned activities will not be large (Table 2).

In the fall, beluga whale densities in the Chukchi Sea are expected to be somewhat higher than in the summer because individuals of the eastern Chukchi Sea stock and the Beaufort Sea stock will be migrating south to their wintering grounds in the Bering Sea (Allen and Angliss 2010). However, there were no beluga sightings reported during > 18,000 km of vessel based effort in good visibility conditions during 2006–2008 industry operations in the Chukchi Sea (Haley *et al.* 2010). Densities derived from survey results in the northern Chukchi Sea in Clarke and Ferguson (in prep.) were used as the average density for open-water fall season estimates (see Table 3). Clarke and Ferguson (in prep.) reported 3 beluga sightings (6 individuals) during 10,036 km of on-transect effort in water depths 36–50 m. The mean group size of those three sightings is 2 animals. A f(0) value of 2.841 and g(0) value of 0.58 from Harwood *et al.* (1996) were used in the calculation. Moore *et al.* (2000) reported lower than expected beluga sighting rates in open-water during fall surveys in the Beaufort and Chukchi seas, so an inflation value of 4 was used to estimate the average ice-margin density from the open-water density. Based on the lack of any beluga sightings from vessels operating in the Chukchi Sea during non-seismic periods and locations in September–October of 2006–2008 (Haley *et al.* 2010), the relative low densities shown in Table 3 are consistent with what is likely to be observed from vessels during the planned operations.

TABLE 2—EXPECTED DENSITIES OF CETACEANS AND SEALS IN AREAS OF THE CHUKCHI SEA, ALASKA, DURING THE PLANNED SUMMER (JULY–AUGUST) PERIOD OF THE SHALLOW HAZARDS SURVEY PROGRAM

Species	Open water	Ice margin
	Average density (#/km^2)	Average density (#/km^2)
Beluga whale	0.0010	0.0040
Narwhal	0.0000	0.0000
Killer whale	0.0001	0.0001
Harbor porpoise	0.0011	0.0011
Bowhead whale	0.0013	0.0013
Fin whale	0.0001	0.0001
Gray whale	0.0258	0.0258
Humpback whale	0.0001	0.0001
Minke whale	0.0001	0.0001
Bearded seal	0.0107	0.0142
Ribbon seal	0.0005	0.0005
Ringed seal	0.3668	0.4891
Spotted seal	0.0073	0.0098

TABLE 3—EXPECTED DENSITIES OF CETACEANS AND SEALS IN AREAS OF THE CHUKCHI SEA, ALASKA, DURING THE PLANNED FALL (SEPTEMBER–OCTOBER) PERIOD OF THE SHALLOW HAZARDS SURVEY PROGRAM

Species	Open water	Ice margin
	Average density (#/km^2)	Average density (#/km^2)
Beluga whale	0.0015	0.0060
Narwhal	0.0000	0.0000
Killer whale	0.0001	0.0001
Harbor porpoise	0.0001	0.0001
Bowhead whale	0.0219	0.0438
Fin whale	0.0001	0.0001
Gray whale	0.0080	0.0080
Humpback whale	0.0001	0.0001
Minke whale	0.0001	0.0001
Bearded seal	0.0107	0.0142

TABLE 3—EXPECTED DENSITIES OF CETACEANS AND SEALS IN AREAS OF THE CHUKCHI SEA, ALASKA, DURING THE PLANNED FALL (SEPTEMBER–OCTOBER) PERIOD OF THE SHALLOW HAZARDS SURVEY PROGRAM—Continued

Species	Open water	Ice margin
	Average density (#/km²)	Average density (#/km²)
Ribbon seal	0.0005	0.0005
Ringed seal	0.2458	0.3277
Spotted seal	0.0049	0.0065

Bowhead Whales—By July, most bowhead whales are northeast of the Chukchi Sea, within or migrating toward their summer feeding grounds in the eastern Beaufort Sea. No bowheads were reported during 10,684 km of on-transect effort in the Chukchi Sea by Moore et *al.* (2000). Aerial surveys in 2008–2010 by the NMML as part of the COMIDA project reported six sightings during 25,781 km of on-transect effort (Clarke and Ferguson 2011). Two of the six sightings were in waters ≤ 35 m deep and the remaining four sightings were in waters 51–200 m deep. Bowhead whales were also rarely sighted in July–August of 2006–2008 during aerial surveys of the Chukchi Sea coast (Thomas *et al.* 2010). This is consistent with movements of tagged whales (ADFG 2010) all of which moved through the Chukchi Sea by early May 2009, and tended to travel relatively close to shore, especially in the northern Chukchi Sea. The estimate of summer bowhead whale density in the Chukchi Sea was calculated by assuming there was one bowhead sighting during the 11,985 km of survey effort in waters 36–50 m deep in the Chukchi Sea during July–August reported in Clarke and Ferguson (in prep.), although no bowheads were actually observed during those surveys. The mean group size from September–October sightings reported in Clarke and Ferguson (in prep.) is 1.1, and this was also used in the calculation of summer densities. The group size value, along with a f(0) value of 2 and a g(0) value of 0.07, both from Thomas *et al.* (2002) were used to estimate a summer density of bowhead whales (Table 2). Bowheads are not expected to be encountered in higher densities near ice in the summer (Moore *et al.* 2000), so the same density estimates are used for open-water and ice-margin habitats. Densities from vessel based surveys in the Chukchi Sea during non-seismic periods and locations in July–August of 2006–2008 (Haley *et al.* 2010) ranged from 0.0001–0.0007/km² with a maximum 95 percent confidence interval (CI) of 0.0029/km². This suggests the densities used in the calculations and shown in Table 3 are somewhat higher than are likely to be observed from vessels near the area of planned operations.

During the fall, bowhead whales that summered in the Beaufort Sea and Amundsen Gulf migrate west and south to their wintering grounds in the Bering Sea, making it more likely that bowheads will be encountered in the Chukchi Sea at this time of year. Moore *et al.* (2000; Table 8) reported 34 bowhead sightings during 44,354 km of on-transect survey effort in the Chukchi Sea during September–October. Thomas *et al.* (2010) also reported increased sightings on coastal surveys of the Chukchi Sea during September and October of 2006–2008. GPS tagging of bowheads appear to show that migration routes through the Chukchi Sea are more variable than through the Beaufort Sea (Quakenbush *et al.* 2010). Some of the routes taken by bowheads remain well north of the planned activities while others have passed near to or through the area. Kernel densities estimated from GPS locations of whales suggest that bowheads do not spend much time (e.g., feeding or resting) in the north-central Chukchi Sea near the area of planned activities (Quakenbush *et al.* 2010). Clarke and Ferguson (in prep.) reported 14 sightings (15 individuals) during 10,036 km of on transect aerial survey effort in 2008–2010. The mean group size from those sightings is 1.1. The same f(0) and g(0) values that were used for the summer estimates above were used for the fall estimates (Table 3). Moore *et al.* (2000) found that Bowheads were detected more often than expected in association with ice in the Chukchi Sea in September–October, so a density of twice the average open-water density was used as the average ice-margin density (Table 3). Densities from vessel based surveys in the Chukchi Sea during non-seismic periods and locations in September–October of 2006–2008 (Haley *et al.* 2010) ranged from 0.0003/km² to 0.0044/km² with a maximum 95 percent CI of 0.0419 km². This suggests the densities used in the calculations and shown in Table 3 are somewhat higher than are likely to be observed from vessels near the area of planned operations.

Gray Whales—Gray whale densities are expected to be much higher in the summer months than during the fall. Moore *et al.* (2000) found the distribution of gray whales in the planned operational area was scattered and generally limited to nearshore areas where most whales were observed in water less than 35 m deep. Thomas *et al.* (2010) also reported substantial declines in the sighting rates of gray whales in the fall. The average open-water summer density (Table 2) was calculated from effort and sightings reported by Clarke and Ferguson (in prep.) for water depths 36–50 m including 54 sightings (73 individuals) during 11,985 km of on-transect effort. The average group size of those sightings is 1.35 animals. Correction factors f(0) = 2.49 (Forney and Barlow 1998) and g(0) = 0.30 (Forney and Barlow 1998; Mallonee 1991) were also used in the density calculation. Gray whales are not commonly associated with sea ice, but may be present near it, so the same densities were used for ice-margin habitat as were derived for open-water habitat during both seasons. Densities from vessel based surveys in the Chukchi Sea during non-seismic periods and locations in July–August of 2006–2008 (Haley *et al.* 2010) ranged from 0.0021/km² to 0.0080/km² with a maximum 95 percent CI of 0.0336 km².

In the fall, gray whales may be dispersed more widely through the northern Chukchi Sea (Moore *et al.* 2000), but overall densities are likely to be decreasing as the whales begin migrating south. A density calculated from effort and sightings (15 sightings [19 individuals] during 10,036 km of on-transect effort) in water 36–50 m deep during September–October reported by Clarke and Ferguson (in prep.) was used as the average estimate for the Chukchi Sea during the fall period (Table 3). The corresponding group size value of 1.26, along with the same f(0) and g(0) values described above were also used in the calculation. Densities from vessel based surveys in the Chukchi Sea during non-seismic periods and locations in July–

August of 2006–2008 (Haley *et al.* 2010) ranged from 0.0026/km² to 0.0042/km² with a maximum 95 percent CI of 0.0277 km².

Harbor Porpoise—Harbor Porpoise densities were estimated from industry data collected during 2006–2008 activities in the Chukchi Sea. Prior to 2006, no reliable estimates were available for the Chukchi Sea and harbor porpoise presence was expected to be very low and limited to nearshore regions. Observers on industry vessels in 2006–2008, however, recorded sightings throughout the Chukchi Sea during the summer and early fall months. Density estimates from 2006–2008 observations during non-seismic periods and locations in July–August ranged from 0.0008/km² to 0.0015/km² with a maximum 95 percent CI of 0.0079/km² (Haley *et al.* 2010). The average of those three years (0.0011/km²) was used as the average open-water density estimate while the high value (0.0015/km²) was used as the maximum estimate (Table 2). Harbor porpoise are not expected to be present in higher numbers near ice, so the open-water densities were used for ice-margin habitat in both seasons. Harbor porpoise densities recorded during industry operations in the fall months of 2006–2008 were slightly lower than the summer months and ranged from 0.0002/km² to 0.0010/km² with a maximum 95 percent CI of 0.0093/km². The average of those three years (0.0001/km²) was again used as the average density estimate and the high value 0.0011/km² was used as the maximum estimate (Table 3).

Other Cetaceans—The remaining five cetacean species that could be encountered in the Chukchi Sea during Statoil's planned activities include the humpback whale, killer whale, minke whale, fin whale, and narwhal. Although there is evidence of the occasional occurrence of these animals in the Chukchi Sea, it is unlikely that more than a few individuals will be encountered during the planned activities. George and Suydam (1998) reported killer whales, Brueggeman *et al.* (1990) and Haley *et al.* (2010) reported minke whale, and COMIDA (2009) and Haley *et al.* (2010) reported fin whales. Narwhal sightings in the Chukchi Sea have not been reported in recent literature, but subsistence hunters occasionally report observations near Barrow, and Reeves *et al.* (2002) indicated a small number of extralimital sightings in the Chukchi Sea.

(2) Pinnipeds

Four species of pinnipeds may be encountered in the Chukchi Sea: Ringed seal, bearded seal, spotted seal, and ribbon seal. Each of these species, except the spotted seal, is associated with both the ice margin and the nearshore area. The ice margin is considered preferred habitat (as compared to the nearshore areas) during most seasons.

Ringed and Bearded Seals—Ringed seal and bearded seal summer ice-margin densities (Table 2) were taken from Bengtson *et al.* (2005) who conducted spring surveys in the offshore pack ice zone (zone 12P) of the northern Chukchi Sea. However, a correction for bearded seal availability bias, g(0), based on haulout and diving patterns was not available and used in the reported densities. Densities of ringed and bearded seals in open water are expected to be somewhat lower in the summer when preferred pack ice habitat may still be present in the Chukchi Sea. Average and maximum open-water densities have been estimated as ¾ of the ice margin densities during both seasons for both species. The fall density of ringed seals in the offshore Chukchi Sea has been estimated as ⅔ the summer densities because ringed seals begin to reoccupy nearshore fast ice areas as it forms in the fall. Bearded seals may also begin to leave the Chukchi Sea in the fall, but less is known about their movement patterns so fall densities were left unchanged from summer densities. For comparison, the ringed seal density estimates calculated from data collected during summer 2006–2008 industry operations ranged from 0.0158/km² to 0.0687/km² with a maximum 95 percent CI of 0.1514/km² (Haley *et al.* 2010). These estimates are lower than those made by Bengtson *et al.* (2005) which is not surprising given the different survey methods and timing.

Spotted Seal—Little information on spotted seal densities in offshore areas of the Chukchi Sea is available. Spotted seal densities in the summer were estimated by multiplying the ringed seal densities by 0.02. This was based on the ratio of the estimated Chukchi populations of the two species. Chukchi Sea spotted seal abundance was estimated by assuming that 8 percent of the Alaskan population of spotted seals is present in the Chukchi Sea during the summer and fall (Rugh *et al.* 1997), the Alaskan population of spotted seals is 59,214 (Allen and Angliss 2010), and that the population of ringed seals in the Alaskan Chukchi Sea is ~208,000 animals (Bengtson *et al.* 2005). In the fall, spotted seals show increased use of coastal haulouts so densities in offshore areas were estimated to be ⅔ of the summer densities.

Ribbon Seal—Two ribbon seal sightings were reported during industry vessel operations in the Chukchi Sea in 2006–2008 (Haley *et al.* 2010). The resulting density estimate of 0.0005/km² was used as the average density.

Potential Number of Takes by Harassment

This subsection provides estimates of the number of individuals potentially exposed to sound levels ≥ 160 dB_{rms} re 1 μPa by pulsed airgun sounds and to ≥ 120 dB_{rms} re 1 μPa by non-impulse sounds during geotechnical soil investigations. The estimates are based on a consideration of the number of marine mammals that might be disturbed appreciably by operations in the Chukchi Sea and the anticipated area exposed to those sound levels.

The number of individuals of each species potentially exposed to received levels of pulsed sounds ≥ 160 dB_{rms} re 1 μPa or to ≥ 120 dB_{rms} re 1 μPa by continuous sounds within each season and habitat zone was estimated by multiplying

- The anticipated area to be ensonified to the specified level in each season and habitat zone to which that density applies, by
- The expected species density.

The numbers of individuals potentially exposed were then summed for each species across the two seasons and habitat zones. Some of the animals estimated to be exposed, particularly migrating bowhead whales, might show avoidance reactions before being exposed to pulsed airgun sounds ≥ 160 dB_{rms} re 1 μPa. Thus, these calculations actually estimate the number of individuals potentially exposed to the specified sound levels that would occur if there were no avoidance of the area ensonified to that level.

Site survey and geotechnical soil investigations are planned to occur primarily in August and September, with the potential to continue into mid-November, if necessary and weather permitting. For the purposes of assigning activities to the summer (August) and fall (September–October) periods for which densities have been estimated above, we have assumed that half of the operations will occur during the summer period and half will occur in the fall period. Additionally, the planned activities cannot be completed in or near significant amounts of sea ice, so 90% of the activity each season (and associated ensonified areas) has been multiplied by the open-water densities described above, while the remaining 10% of activity has been multiplied by the ice-margin densities.

Species with an estimated average number of individuals exposed equal to zero are included below for completeness, but are not likely to be encountered.

(1) Shallow Hazards and Site Clearance Surveys

The estimated numbers of marine mammals potentially exposed to airgun sounds with received levels ≥ 160 dB_{rms} from site surveys on Statoil's leases are shown in Table 4. The average estimate of the number of individual bowhead whales exposed to received sound levels ≥ 160 dB is 11. The average estimate for gray whales is slightly greater at 18, while few belugas are expected to be exposed (Table 4). Few other cetaceans (such as narwhal, harbor porpoise, killer, humpback, fin, and minke whales) are likely to be exposed to airgun sounds ≥ 160 dB, but estimates have been included to account for chance encounters.

Ringed seals are expected to be the most abundant animal in the Chukchi Sea during this period and the average estimate of the number exposed to ≥ 160 dB by site survey activities is 337 (Table 4). Estimated exposures of other seal species are substantially below those for ringed seals (Table 4).

TABLE 4—SUMMARY OF THE NUMBER OF MARINE MAMMALS IN AREAS WHERE MAXIMUM RECEIVED SOUND LEVELS IN THE WATER WOULD BE ≥ 160 DB IN SUMMER (AUG) AND FALL (SEP–OCT) PERIODS DURING STATOIL'S PLANNED SITE SURVEYS IN THE CHUKCHI SEA, ALASKA. NOT ALL MARINE MAMMALS ARE EXPECTED TO CHANGE THEIR BEHAVIOR WHEN EXPOSED TO THESE SOUND LEVELS

Species	Number of individuals exposed to sound levels ≥ 160 dB				
	Summer		Fall		Total
	Open water	Ice margin	Open water	Ice margin	
Beluga whale	0	0	1	0	2
Narwhal	0	0	0	0	2
Killer whale	0	0	0	0	2
Harbor porpoise	1	0	0	0	1
Bowhead whale	1	0	10	0	11
Gray whale	12	1	4	1	18
Humpback whale	0	0	0	0	2
Fin whale	0	0	0	0	2
Minke whale	0	0	0	0	2
Bearded seal	5	1	5	1	12
Ribbon seal	0	0	0	0	1
Ringed seal	171	25	115	25	337
Spotted seal	3	1	2	1	7

(2) Geotechnical Soil Investigations

The estimated numbers of marine mammals potentially exposed to continuous sounds with received levels ≥ 120 dB_{rms} from geotechnical soil investigations on Statoil's leases and jointly owned leases are shown in Table 5. The average estimate of the number of individual bowhead whales exposed to received sound levels ≥ 120 dB is 15. The average estimate for gray whales is slightly larger at 26 individuals (Table 5). Few other cetaceans (such as narwhal, harbor porpoise, killer, humpback, fin, and minke whales) are likely to be exposed to soil investigation sounds ≥ 120 dB, but estimates have been included to account for chance encounters.

The average estimate of the number of ringed seals potentially exposed to ≥120 dB by soil investigation activities is 467 (Table 5). Estimated exposures of other seal species are substantially below those for ringed seals (Table 5).

TABLE 5—SUMMARY OF THE NUMBER OF MARINE MAMMALS IN AREAS WHERE MAXIMUM RECEIVED SOUND LEVELS IN THE WATER WOULD BE ≥ 120 DB IN SUMMER (AUG) AND FALL (SEP–OCT) PERIODS DURING STATOIL'S PLANNED GEOTECHNICAL SOIL INVESTIGATIONS IN THE CHUKCHI SEA, ALASKA. NOT ALL MARINE MAMMALS ARE EXPECTED TO CHANGE THEIR BEHAVIOR WHEN EXPOSED TO THESE SOUND LEVELS

Species	Number of individuals exposed to sound levels ≥ 120 dB				
	Summer		Fall		Total
	Open water	Ice margin	Open water	Ice margin	
Beluga whale	1	0	1	0	2
Narwhal	0	0	0	0	3
Killer whale	0	0	0	0	3
Harbor porpoise	1	0	0	0	1
Bowhead whale	1	0	14	0	15
Gray whale	17	2	5	2	26
Humpback whale	0	0	0	0	3
Fin whale	0	0	0	0	3
Minke whale	0	0	0	0	3
Bearded seal	7	1	7	1	16
Ribbon seal	0	0	0	0	1
Ringed seal	238	35	159	35	467
Spotted seal	5	1	3	1	10

Estimated Take Conclusions

Cetaceans—Effects on cetaceans are generally expected to be restricted to avoidance of an area around the seismic survey and short-term changes in behavior, falling within the MMPA definition of "Level B harassment".

Using the 160 dB criterion, the average estimates of the numbers of individual cetaceans exposed to sounds < 160 dB_{rms} re 1 μPa represent varying proportions of the populations of each species in the Beaufort Sea and adjacent waters. For species listed as "Endangered" under the ESA, the estimates include approximately 26 bowheads. This number is approximately 0.18% of the Bering-Chukchi-Beaufort population of > 14,247 assuming 3.4% annual population growth from the 2001 estimate of > 10,545 animals (Zeh and Punt 2005). For other cetaceans that might occur in the vicinity of the shallow hazards survey in the Chukchi Sea, they also represent a very small proportion of their respective populations. The average estimates of the number of belugas, killer whales, harbor porpoises, gray whales, humpback whales, fin whales, and minke whales that might be exposed to <160 dB and 120 dB re 1 μPa are 4, 5, 2, 44, 5, 5, and 5. These numbers represent 0.11%, 1.59%, 0.004%, 0.25%, 0.53%, 0.09%, and 0.50% of these species of their respective populations in the proposed action area. No population estimates of narwhal are available in U.S. waters due to its extralimital distribution here. The world population of narwhal is estimated at 75,000 (Laidre *et al.* 2008), and most of them are concentrated in the fjords and inlets of Northern Canada and western Greenland. The estimated take of 5 narwhals represents approximately 0.01% of its population.

Seals—A few seal species are likely to be encountered in the study area, but ringed seal is by far the most abundant in this area. The average estimates of the numbers of individuals exposed to sounds at received levels <160 dB_{rms} re 1 μPa during the proposed shallow hazards survey are as follows: ringed seals (803), bearded seals (28), spotted seals (17), and ribbon seals (2). These numbers represent 0.35%, 0.01%, 0.03%, and 0.002% of Alaska stocks of ringed, bearded, spotted, and ribbon seals, respectively.

Negligible Impact and Small Numbers Analysis and Preliminary Determination

NMFS has defined "negligible impact" in 50 CFR 216.103 as "* * * an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) The number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the takes occur.

No injuries or mortalities are anticipated to occur as a result of Statoil's proposed 2011 open water marine shallow hazards surveys in the Chukchi Seas, and none are proposed to be authorized. In addition, these surveys would use a small 40 in^3 airgun array and several mid- to high-frequency active acoustic sources. The acoustic power output is much lower than full scale airgun arrays used in a 2D or 3D seismic survey, and thus generates much lower source levels. The modeled isopleths at 160 dB is expected to be less than 2.25 km from the source (see discussion earlier). Additionally, animals in the area are not expected to incur hearing impairment (*i.e.,* TTS or PTS) or non-auditory physiological effects. Takes will be limited to Level B behavioral harassment. Although it is possible that some individuals of marine mammals may be exposed to sounds from shallow hazards survey activities more than once, the expanse of these multi-exposures are expected to be less extensive since both the animals and the survey vessels will be moving constantly in and out of the survey areas.

Most of the bowhead whales encountered during the summer will likely show overt disturbance (avoidance) only if they receive airgun sounds with levels ≥ 160 dB re 1 μPa. Odontocete reactions to seismic energy pulses are usually assumed to be limited to shorter distances from the airgun(s) than are those of mysticetes, probably in part because odontocete low-frequency hearing is assumed to be less sensitive than that of mysticetes. However, at least when in the Canadian Beaufort Sea in summer, belugas appear to be fairly responsive to seismic energy, with few being sighted within 6–12 mi (10–20 km) of seismic vessels during aerial surveys (Miller *et al.* 2005). Belugas will likely occur in small numbers in the Chukchi Sea during the survey period and few will likely be affected by the survey activity. In addition, due to the constant moving of the survey vessel, the duration of the noise exposure by cetaceans to seismic impulse would be brief. For the same reason, it is unlikely that any individual animal would be exposed to high received levels multiple times.

For animals exposed to machinery noise from geotechnical oil investigations, NMFS considers that at received levels ≥ 120 dB re 1 μPa, the animals could respond behaviorally in a manner that NMFS considers Level B harassment due to the non-pulse nature of the noise involved in this activity. During soil investigation operations, the most intensive noise source is from the dynamic positioning (DP) system that automatically controls and coordinates vessel movements using bow and/or stern thrusters. Measurements of a similar vessel in DP mode in the Chukchi Sea in 2010 provided an estimated source level at about 176 dB re 1 μPa, which is below what NMFS uses to assess Level A harassment of received levels at 180 dB for cetaceans and 190 dB for pinnipeds. In addition, the duration of the entire geotechnical oil investigation is approximately 14 days, and DP will only be running sporadically when needed to position the vessel. In addition, the oil investigation operations are expected to be stationary, with limited area to be ensonified. Therefore, the impacts to marine mammals in the vicinity of the oil investigation operations are expected to be in short duration and localized.

Taking into account the mitigation measures that are planned, effects on cetaceans are generally expected to be restricted to avoidance of a limited area around the survey operation and short-term changes in behavior, falling within the MMPA definition of "Level B harassment".

Furthermore, the estimated numbers of animals potentially exposed to sound levels sufficient to cause appreciable disturbance are very low percentages of the population sizes in the Bering-Chukchi-Beaufort seas, as described above.

The many reported cases of apparent tolerance by cetaceans of seismic exploration, vessel traffic, and some other human activities show that co-existence is possible. Mitigation measures such as controlled vessel speed, dedicated marine mammal observers, non-pursuit, and shut downs or power downs when marine mammals are seen within defined ranges will further reduce short-term reactions and minimize any effects on hearing sensitivity. In all cases, the effects are expected to be short-term, with no lasting biological consequence.

Some individual pinnipeds may be exposed to sound from the proposed marine surveys more than once during

the time frame of the project. However, as discussed previously, due to the constant moving of the survey vessel, the probability of an individual pinniped being exposed to sound multiple times is much lower than if the source is stationary. Therefore, NMFS has preliminarily determined that the exposure of pinnipeds to sounds produced by the proposed shallow hazards surveys and soil investigation in the Chukchi Sea is not expected to result in more than Level B harassment and is anticipated to have no more than a negligible impact on the animals.

Of the thirteen marine mammal species likely to occur in the proposed marine survey area, only the bowhead, fin, and humpback whales are listed as endangered under the ESA. These species are also designated as "depleted" under the MMPA. Despite these designations, the Bering-Chukchi-Beaufort stock of bowheads has been increasing at a rate of 3.4 percent annually for nearly a decade (Allen and Angliss 2010). Additionally, during the 2001 census, 121 calves were counted, which was the highest yet recorded. The calf count provides corroborating evidence for a healthy and increasing population (Allen and Angliss 2010). The occurrence of fin and humpback whales in the proposed marine survey areas is considered very rare. There is no critical habitat designated in the U.S. Arctic for the bowhead, fin, and humpback whale. The bearded and ringed seals are "candidate species" under the ESA, meaning they are currently being considered for listing but are not designated as depleted under the MMPA. None of the other species that may occur in the project area are listed as threatened or endangered under the ESA or designated as depleted under the MMPA.

Potential impacts to marine mammal habitat were discussed previously in this document (see the "Anticipated Effects on Habitat" section). Although some disturbance is possible to food sources of marine mammals, the impacts are anticipated to be minor enough as to not affect rates of recruitment or survival of marine mammals in the area. Based on the vast size of the Arctic Ocean where feeding by marine mammals occurs versus the localized area of the marine survey activities, any missed feeding opportunities in the direct project area would be minor based on the fact that other feeding areas exist elsewhere.

The estimated takes proposed to be authorized represent 0.11% of the Eastern Chukchi Sea population of approximately 3,710 beluga whales (Allen and Angliss 2010), 1.59% of Aleutian Island and Bering Sea stock of approximately 314 killer whales, 0.004% of Bering Sea stock of approximately 48,215 harbor porpoises, 0.25% of the Eastern North Pacific stock of approximately 17,752 gray whales, 0.18% of the Bering-Chukchi-Beaufort population of 14,247 bowhead whales assuming 3.4 percent annual population growth from the 2001 estimate of 10,545 animals (Zeh and Punt, 2005), 0.53% of the Western North Pacific stock of approximately 938 humpback whales, 0.09% of the North Pacific stock of approximately 5,700 fin whales, and 0.50% of the Alaska stock of approximately 1,003 minke whales. The take estimates presented for bearded, ringed, spotted, and ribbon seals represent 0.01, 0.35, 0.03, and 0.002 percent of U.S. Arctic stocks of each species, respectively. These estimates represent the percentage of each species or stock that could be taken by Level B behavioral harassment if each animal is taken only once. In addition, the mitigation and monitoring measures (described previously in this document) proposed for inclusion in the IHA (if issued) are expected to reduce even further any potential disturbance to marine mammals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS preliminarily finds that Statoil's proposed 2011 open water shallow hazards survey in the Chukchi Sea may result in the incidental take of small numbers of marine mammals, by Level B harassment only, and that the total taking from the marine surveys will have a negligible impact on the affected species or stocks. Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

Relevant Subsistence Uses

The disturbance and potential displacement of marine mammals by sounds from the proposed marine surveys are the principal concerns related to subsistence use of the area. Subsistence remains the basis for Alaska Native culture and community. Subsistence hunting and fishing continue to be prominent in the household economies and social welfare of some Alaskan residents, particularly among those living in small, rural villages (Wolfe and Walker 1987). In rural Alaska, subsistence activities are often central to many aspects of human existence, including patterns of family life, artistic expression, and community religious and celebratory activities. Additionally, the animals taken for subsistence provide a significant portion of the food that will last the community throughout the year. The main species that are hunted include bowhead and beluga whales, ringed, spotted, and bearded seals, walruses, and polar bears. (Both the walrus and the polar bear are under the USFWS' jurisdiction.) The importance of each of these species varies among the communities and is largely based on availability.

Marine mammals are legally hunted in Alaskan waters by coastal Alaska Natives; species hunted include bowhead and beluga whales; ringed, spotted, and bearded seals; walruses, and polar bears. The importance of each of the various species varies among the communities based largely on availability. Bowhead whales, belugas, and walruses are the marine mammal species primarily harvested during the time of the proposed shallow hazard survey. There is little or no bowhead hunting by the community of Point Lay, so beluga and walrus hunting are of more importance there. Members of the Wainwright community hunt bowhead whales in the spring, although bowhead whale hunting conditions there are often more difficult than elsewhere, and they do not hunt bowheads during seasons when Statoil's survey operation would occur. Depending on the level of success during the spring bowhead hunt, Wainwright residents may be very dependent on the presence of belugas in a nearby lagoon system during July and August. Barrow residents focus hunting efforts on bowhead whales during the spring and generally do not hunt beluga then. However, Barrow residents also hunt in the fall, when Statoil expects to be conducting shallow hazards surveys (though not near Barrow).

(1) Bowhead Whales

Bowhead whale hunting is a key activity in the subsistence economies of northwest Arctic communities. The whale harvests have a great influence on social relations by strengthening the sense of Inupiat culture and heritage in addition to reinforcing family and community ties.

An overall quota system for the hunting of bowhead whales was established by the International Whaling Commission (IWC) in 1977. The quota is now regulated through an agreement between NMFS and the Alaska Eskimo Whaling Commission (AEWC). The AEWC allots the number of bowhead whales that each whaling community may harvest annually (USDI/BLM 2005). The annual take of bowhead whales has varied due to (a) changes in the allowable quota level and (b) year-to-

year variability in ice and weather conditions, which strongly influence the success of the hunt.

Bowhead whales migrate around northern Alaska twice each year, during the spring and autumn, and are hunted in both seasons. Bowhead whales are hunted from Barrow during the spring and the fall migration and animals are not successfully harvested every year. The spring hunt along Chukchi villages and at Barrow occurs after leads open due to the deterioration of pack ice; the spring hunt typically occurs from early April until the first week of June. The fall migration of bowhead whales that summer in the eastern Beaufort Sea typically begins in late August or September. Fall migration into Alaskan waters is primarily during September and October.

In the fall, subsistence hunters use aluminum or fiberglass boats with outboards. Hunters prefer to take bowheads close to shore to avoid a long tow during which the meat can spoil, but Braund and Moorehead (1995) report that crews may (rarely) pursue whales as far as 50 mi (80 km). The autumn bowhead hunt usually begins in Barrow in mid-September, and mainly occurs in the waters east and northeast of Point Barrow.

The scheduling of this shallow hazard survey has been discussed with representatives of those concerned with the subsistence bowhead hunt, most notably the AEWC, the Barrow Whaling Captains' Association, and the North Slope Borough (NSB) Department of Wildlife Management.

The planned mobilization and start date for shallow hazards surveys in the Chukchi Sea (~25 July and ~1 August, respectively) is well after the end of the spring bowhead migration and hunt at Wainwright and Barrow. Shallow hazards survey and soil investigation operations will be conducted far offshore from Barrow and Wainwright are not expected to conflict with subsistence hunting activities. Specific concerns of the Barrow whaling captains are addressed as part of the Plan of Cooperation/Conflict Avoidance Agreement that is being negotiated with the AEWC (see below).

(2) Beluga Whales

Beluga whales are available to subsistence hunters along the coast of Alaska in the spring when pack-ice conditions deteriorate and leads open up. Belugas may remain in coastal areas or lagoons through June and sometimes into July and August. The community of Point Lay is heavily dependent on the hunting of belugas in Kasegaluk Lagoon for subsistence meat. From 1983–1992 the average annual harvest was ~40 whales (Fuller and George 1997). In Wainwright and Barrow, hunters usually wait until after the spring bowhead whale hunt is finished before turning their attention to hunting belugas. The average annual harvest of beluga whales taken by Barrow for 1962–1982 was five (MMS 1996). The Alaska Beluga Whale Committee recorded that 23 beluga whales had been harvested by Barrow hunters from 1987 to 2002, ranging from 0 in 1987, 1988 and 1995 to the high of 8 in 1997 (Fuller and George 1997; Alaska Beluga Whale Committee 2002 in USDI/BLM 2005). The seismic survey activities take place well offshore, far away from areas that are used for beluga hunting by the Chukchi Sea communities.

(3) Ringed Seals

Ringed seals are hunted mainly from October through June. Hunting for these smaller mammals is concentrated during winter because bowhead whales, bearded seals and caribou are available through other seasons. In winter, leads and cracks in the ice off points of land and along the barrier islands are used for hunting ringed seals. The average annual ringed seal harvest was 49 seals in Point Lay, 86 in Wainwright, and 394 in Barrow (Braund *et al.* 1993; USDI/BLM 2003; 2005). Although ringed seals are available year-round, the planned activities will not occur during the primary period when these seals are typically harvested. Also, the activities will be largely in offshore waters where the activities will not influence ringed seals in the nearshore areas where they are hunted.

(4) Spotted Seals

The spotted seal subsistence hunt peaks in July and August along the shore where the seals haul out, but usually involves relatively few animals. Spotted seals typically migrate south by October to overwinter in the Bering Sea. During the fall migration spotted seals are hunted by the Wainright and Point Lay communities as the seals move south along the coast (USDI/BLM 2003). Spotted seals are also occasionally hunted in the area off Point Barrow and along the barrier islands of Elson Lagoon to the east (USDI/BLM 2005). The planned activities will remain offshore of the coastal harvest area of these seals and should not conflict with harvest activities.

(5) Bearded Seals

Bearded seals, although generally not favored for their meat, are important to subsistence activities in Barrow and Wainright, because of their skins. Six to nine bearded seal hides are used by whalers to cover each of the skin-covered boats traditionally used for spring whaling. Because of their valuable hides and large size, bearded seals are specifically sought. Bearded seals are harvested during the spring and summer months in the Chukchi Sea (USDI/BLM 2003; 2005). The animals inhabit the environment around the ice floes in the drifting nearshore ice pack, so hunting usually occurs from boats in the drift ice. Most bearded seals are harvested in coastal areas inshore of the proposed survey so no conflicts with the harvest of bearded seals are expected.

In the event that both marine mammals and hunters are near the areas of planned operations, the proposed project potentially could impact the availability of marine mammals for harvest in a small area immediately around the vessel, in the case of pinnipeds, and possibly in a large area in the case of migrating bowheads. However, the majority of marine mammals are taken by hunters within ~21 mi (~33 km) from shore, and the survey activities will occur far offshore, well outside the hunting areas. Considering the timing and location of the proposed shallow hazards survey activities, as described earlier in the document, the proposed project is not expected to have any significant impacts to the availability of marine mammals for subsistence harvest. Specific concerns of the respective communities are addressed as part of the Plan of Cooperation between Statoil and the AEWC.

Potential Impacts to Subsistence Uses

NMFS has defined "unmitigable adverse impact" in 50 CFR 216.103 as:

> * * * an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Noise and general activity during Statoil's proposed open water shallow hazards survey have the potential to impact marine mammals hunted by Native Alaskans. In the case of cetaceans, the most common reaction to anthropogenic sounds (as noted previously in this document) is avoidance of the ensonified area. In the case of bowhead whales, this often means that the animals divert from their

normal migratory path by several kilometers. Additionally, general vessel presence in the vicinity of traditional hunting areas could negatively impact a hunt.

In the case of subsistence hunts for bowhead whales in the Chukchi Sea, there could be an adverse impact on the hunt if the whales were deflected seaward (further from shore) in traditional hunting areas. The impact would be that whaling crews would have to travel greater distances to intercept westward migrating whales, thereby creating a safety hazard for whaling crews and/or limiting chances of successfully striking and landing bowheads.

In addition, Native knowledge indicates that bowhead whales become increasingly "skittish" in the presence of seismic noise. Whales are more wary around the hunters and tend to expose a much smaller portion of their back when surfacing (which makes harvesting more difficult). Additionally, natives report that bowheads exhibit angry behaviors in the presence of seismic, such as tail-slapping, which translate to danger for nearby subsistence harvesters.

Plan of Cooperation (POC or Plan)

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a POC or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes.

Statoil states that it intends to maintain an open and transparent process with all stakeholders throughout the life-cycle of activities in the Chukchi Sea. Statoil began the stakeholder engagement process in 2009 with meeting Chukchi Sea community leaders at the tribal, city, and corporate level. Statoil will continue to engage with leaders, community members, and subsistence groups, as well as local, state, and federal regulatory agencies throughout the exploration and development process.

As part of stakeholder engagement, Statoil is developing a Plan of Cooperation (POC) for the proposed 2011 activities. The POC summarizes the actions Statoil will take to identify important subsistence activities, inform subsistence users of the proposed survey activities, and obtain feedback from subsistence users regarding how to promote cooperation between subsistence activities and the Statoil program.

During the early phase of the POC process for the proposed project, Statoil met with the North Slope Borough Department of Wildlife Management (Dec 2010) and the AEWC (mini-convention in Barrow, Feb 2011). Statoil also arranged to visit and hold public meetings in the affected Chukchi Sea villages, including Pt. Hope, Pt. Lay, Wainwright, and Barrow during the week of 21 March, 2011.

Based upon these meetings, a draft POC document is being developed. Upon completion, the draft POC will be submitted to each of the community leaders Statoil visited during the March meetings as well as other interested community members. Statoil will also submit the draft POC to NMFS, USFWS, and BOEMRE.

A final POC that documents all consultations with community leaders, subsistence user groups, individual subsistence users, and community members will be submitted to NMFS, USFWS, and BOEMRE upon completion of consultations.

Subsistence Mitigation Measures

Statoil plans to introduce the following mitigation measures, plans and programs to potentially affected subsistence groups and communities. These measures, plans, and programs have been effective in past seasons of work in the Arctic and were developed in past consultations with these communities.

Statoil will not be entering the Chukchi Sea until early August, so there will be no potential conflict with spring bowhead whale or beluga subsistence whaling in the polynya zone. Statoil's planned activities area is ~100 mi (~ 161 km) northwest of Wainwright which reduces the potential impact to subsistence hunting activities occurring along the Chukchi Sea coast.

The communication center in Wainwright will be jointly funded by Statoil and other operators, and Statoil will routinely call the communication center according to the established protocol while in the Chukchi Sea. Depending on survey progress, Statoil may perform a crew change in the Nome area in Alaska. The crew change will not involve the use of helicopters. Statoil does have a contingency plan for a potential transfer of a small number of crew via ship-to-shore vessel at Wainwright. If this should become necessary, the Wainwright communications center will be contacted to determine the appropriate vessel route and timing to avoid potential conflict with subsistence users.

Prior to survey activities, Statoil will identify transit routes and timing to avoid other subsistence use areas and communicate with coastal communities before operating in or passing through these areas.

Unmitigable Adverse Impact Analysis and Preliminary Determination

NMFS has preliminarily determined that Statoil's proposed 2011 open water shallow hazards survey in the Chukchi Sea will not have an unmitigable adverse impact on the availability of species or stocks for taking for subsistence uses. This preliminary determination is supported by information contained in this document and Statoil's draft POC. Statoil has adopted a spatial and temporal strategy for its Chukchi Sea operations that should minimize impacts to subsistence hunters. Statoil will enter the Chukchi Sea far offshore, so as to not interfere with July hunts in the Chukchi Sea villages. After the close of the July beluga whale hunts in the Chukchi Sea villages, very little whaling occurs in Wainwright, Point Hope, and Point Lay. Although the fall bowhead whale hunt in Barrow will occur while Statoil is still operating (mid- to late September to October), Barrow is approximately 150 mi (241 km) east of the eastern boundary of the proposed shallow hazards survey site. Based on these factors, Statoil's Chukchi Sea shallow hazards survey is not expected to interfere with the fall bowhead harvest in Barrow. In recent years, bowhead whales have occasionally been taken in the fall by coastal villages along the Chukchi coast, but the total number of these animals has been small.

Adverse impacts are not anticipated on sealing activities since the majority of hunts for seals occur in the winter and spring, when Statoil will not be operating. Additionally, most sealing activities occur much closer to shore than Statoil's proposed shallow hazards survey area.

Based on the measures described in Statoil's Draft POC, the proposed mitigation and monitoring measures (described earlier in this document), and the project design itself, NMFS has determined preliminarily that there will not be an unmitigable adverse impact on subsistence uses from Statoil's open water shallow hazards survey in the Chukchi Sea.

Endangered Species Act (ESA)

There are three marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area: The bowhead, humpback, and fin whales. NMFS' Permits, Conservation and Education Division has initiated consultation with NMFS' Protected

Resources Division under section 7 of the ESA on the issuance of an IHA to Statoil under section 101(a)(5)(D) of the MMPA for this activity. Consultation will be concluded prior to a determination on the issuance of an IHA.

National Environmental Policy Act (NEPA)

In 2010, NMFS prepared an Environmental Assessment (EA) and issued findings of no significant impact (FONSIs) for open-water seismic and marine surveys in the Beaufort and Chukchi seas by Shell and Statoil. A review of Statoil's proposed 2011 open-water shallow hazards surveys indicates that the planned action is essentially the same as the marine survey conducted by Shell in 2010, but on a smaller scale. In addition, the review indicated that there is no significant change in the environmental baselines from what were analyzed in 2010. Therefore, NMFS is preparing a Supplemental EA which incorporates by reference the 2010 EA and other related documents, and updates the activity to reflect the lower impacts compared to the previous season.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to authorize the take of marine mammals incidental to Statoil's 2011 open water shallow hazards survey in the Chukchi Sea, Alaska, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: May 17, 2011.

James H. Lecky,

Director, Office of Protected Resources, National Marine Fisheries Service.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA116

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Pile Replacement Project

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to the U.S. Navy (Navy) to incidentally harass, by Level B harassment only, five species of marine mammals during pile driving and removal activities conducted as part of a pile replacement project in the Hood Canal, Washington.

DATES: This authorization is effective from July 16, 2011, through July 15, 2012.

ADDRESSES: A copy of the IHA and application are available by writing to Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910.

A copy of the application containing a list of the references used in this document may be obtained by writing to the above address, telephoning the contact listed here (see **FOR FURTHER INFORMATION CONTACT**) or visiting the internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications*. Supplemental documents, including the Navy's Environmental Assessment and NMFS' associated Finding of No Significant Impact, prepared pursuant to the National Environmental Policy Act (NEPA), are available at the same site. Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Ben Laws, NMFS, Office of Protected Resources, NMFS, (301) 713–2289.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(D) of the MMPA (16 U.S.C. 1371(a)(5)(D)) directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking by harassment of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and a notice of a proposed authorization is provided to the public for review.

Authorization for incidental taking of small numbers of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The authorization must set forth the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and monitoring and reporting of such takings. NMFS has defined "negligible impact" in 50 CFR 216.103 as "* * * an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA establishes a 45-day time limit for NMFS' review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of small numbers of marine mammals. Within 45 days of the close of the public comment period, NMFS must either issue or deny the authorization.

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as:

> Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Summary of Request

NMFS received an application on December 16, 2010, from the Navy for the taking of marine mammals incidental to pile driving and removal in association with a pile replacement project in the Hood Canal at Naval Base Kitsap in Bangor, Washington (NBKB). Vibratory and impulsive pile driving and vibratory and pneumatic chipping removal operations associated with the pile replacement project have the potential to affect marine mammals within the waterways adjacent to NBKB, and could result in harassment as defined in the MMPA. This pile replacement project will occur between July 16, 2011, and July 15, 2013, with this IHA covering the first year of work. Six species of marine mammals may be present within the waters surrounding NBKB: Steller sea lions (*Eumetopias jubatus*), California sea lions (*Zalophus californianus*), harbor seals (*Phoca vitulina*), killer whales (*Orcinus orca*), Dall's porpoises (*Phocoenoides dalli*), and harbor porpoises (*Phocoena phocoena*). These species may occur year-round in the Hood Canal, with the exception of the Steller sea lion. Steller sea lions are present only from fall to late spring (November–June), outside of