

address new available information regarding the effects of PRBO's seabird and pinniped research activities that may have cumulative impacts to the physical and biological environment. At that time, NMFS concluded that issuance of an IHA for the December 2008 through 2009 season would not significantly affect the quality of the human environment and issued a FONSI for the 2008 SEA regarding PRBO's activities. In conjunction with this year's application, NMFS has again reviewed the 2007 EA and the 2008 SEA and determined that there are no new direct, indirect or cumulative impacts to the human and natural environment associated with the IHA requiring evaluation in a supplemental EA and NMFS, therefore, reaffirms the 2008 FONSI. A copy of the EA, SEA, and the NMFS FONSI for this activity is available upon request (see **ADDRESSES**).

Authorization

As a result of these determinations, NMFS has issued an IHA to PRBO to take marine mammals, by Level B harassment only, incidental to conducting seabird and pinniped research activities on Southeast Farallon Island, Año Nuevo Island, and Point Reyes National Seashore in central California provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: July 29, 2011.

Helen M. Golde,

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

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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; issuance of an incidental take authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to Statoil USA E&P Inc. (Statoil)

to take, by harassment, small numbers of 13 species of marine mammals incidental to shallow hazards and geotechnical surveys in the Chukchi Sea, Alaska, during the 2011 Arctic open-water season.

DATES: Effective August 1, 2011, through November 30, 2011.

ADDRESSES: Inquiry for information on the incidental take authorization should be addressed to P. 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, NMFS' 2010 Environmental Assessment (EA), 2011 Supplemental Environmental Assessment (SEA), Finding of No Significant Impact (FONSI), and the IHA 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#applications>.

Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Shane Guan, Office of Protected Resources, NMFS, (301) 427-8401 or Brad Smith, NMFS, Alaska Region, (907) 271-3023.

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 (Secretary) to allow, upon request, the incidental, but not intentional taking 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 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 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 taking 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. 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].

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 issuance of the authorization.

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 was the one available for public comment (see **ADDRESSES**) and considered by NMFS for the IHA.

The shallow hazards and site clearance surveys would use a towed airgun cluster consisting of four, 10-in³ airguns with a ~600 m (1,969 ft) 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 km² 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 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 5.3 cm or 7.1 cm (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 (328 ft) 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 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 August 1. 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 November 15.

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 in³ airgun cluster, single 10 in³ airgun, Kongsberg SBP3000 sub-bottom profiler, GeoAcoustics 160D side-scan sonar, and a Kongsberg EM2040 multi-beam echosounder. The acoustic characteristics (including operating frequencies and estimated source levels) of all active sources are described in the **Federal Register** notice for the proposed IHA (76 FR 30110; May 24, 2011). That information has not changed and is therefore not repeated here.

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 (328 ft). 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 acoustic characteristics (including operating frequencies and estimated source levels) of all active sources, as well as the sounds produced during soil investigation sampling, are described in the **Federal Register** notice for the proposed IHA (76 FR 30110; May 24, 2011). That information has not changed and is therefore not repeated here.

Comments and Responses

A notice of NMFS' proposal to issue an IHA to Statoil published in the **Federal Register** on May 24, 2011 (76 FR 30110). That notice described, in detail, Statoil's proposed activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals and the availability of marine mammals for subsistence uses. During the 30-day public comment period, NMFS received three comment letters from the

following: The Marine Mammal Commission (Commission); the Alaska Eskimo Whaling Commission (AEWC); and Alaska Wilderness League (AWL), Center for Biological Diversity, Defenders of Wildlife, Earthjustice, Natural Resources Defense Council, Oceana, Pacific Environment, and Sierra Club (collectively "AWL"). The AEWC submitted a copy of the 2011 Conflict Avoidance Agreement (CAA), since Statoil declined to sign the CAA.

Any comments specific to Statoil's application that address the statutory and regulatory requirements or findings NMFS must make to issue an IHA are addressed in this section of the **Federal Register** notice.

MMPA Concerns

Comment 1: AEWC states that Statoil's IHA application NMFS released is incomplete because it did not contain a copy of the Plan of Cooperation (POC). AEWC points out that Statoil stated that it "is developing a Plan of Cooperation (POC) for their proposed 2011 activities." (Statoil IHA Application at page 51), and since Statoil did not provide the POC or any detail on the measures to be adopted in compliance with 50 CFR 216.104(a)(12)(iii), NMFS cannot make the determination required under the MMPA. AEWC further points out that NMFS has previously stated that "[i]t should be understood that the POC is required by NMFS's implementing regulations to be submitted as part of the industry's IHA application" (74 FR 55368, 55393; October 27, 2009). AEWC requests that NMFS enforce the requirement that Statoil set forth, in its application, the proposed measures employed to prevent conflicts with subsistence activities.

Response: Although NMFS agrees with AEWC's statement that a POC is essential for making the determination for granting an IHA to the industry, it is not used to determine the completeness of an IHA application. A complete IHA application should address all fourteen questions in NMFS' marine mammal incidental take application guidelines, which can be found at <http://www.nmfs.noaa.gov/pr/permits/incidental.htm#apply>. Concerning the POC, as stated in item 12 of the application guideline, the applicant "must submit either a 'plan of cooperation' or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses." In the case of Statoil's IHA application, NMFS believes that the company provided detailed information that identified what measures have been

taken and will be taken to minimize any adverse effects to subsistence harvesting of marine mammals, such as maintaining an open and transparent process with all stakeholders throughout the duration of its activities in the Chukchi Sea, identifying transit routes and timing to avoid other subsistence use areas and communicating with coastal communities before operating in or passing through these areas. In addition, Statoil completed the early phase of the POC process for the proposed project by meeting with the North Slope Borough Department of Wildlife Management (December 2010) and the AEWG (mini-convention in Barrow, February 2011), and 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 March 21, 2011. NMFS determined that these activities showed that Statoil was in the process of finalizing its POC with the Native communities, therefore NMFS determined that Statoil's application was complete. Subsequently on June 20, 2011, NMFS received a draft POC with detailed information on the POC process. On July 14, 2011, NMFS received the final POC from Statoil.

Impacts to Marine Mammals

Comment 2: AWL states that NMFS's uniform marine mammal harassment threshold for impulsive sounds does not take into account the documented reactions of specific species found in the Arctic to much lower received levels. The AWL argues by providing an example that harbor porpoises have been shown to be exceptionally sensitive to noise, and NMFS has used 120 dB as the appropriate threshold when authorizing marine mammal take for Navy sonar activities. In addition, the AWL states, by referring to Southall *et al.* (2007), that "a 2007 study found that for migrating bowheads 'the onset of significant behavioral disturbance from multiple pulses occurred at [received levels] around 120 dB re: 1 μ Pa[.]'". The AWL concludes that "the 2007 study in fact determined that the reactions of migrating bowhead whales to sounds as low as 120 dB had a 'higher potential' for affecting foraging, reproduction, or survival rates."

Response: NMFS does not agree with AWL's assessment on acoustic effects of marine mammals. The 120 dB threshold for the onset of behavioral harassment for harbor porpoise by Navy sonar activities is limited to exposure to mid- and high-frequency sonar signals, which are defined as sound with dominant frequency at 1–10 kHz and above 10

kHz, respectively. This is because harbor porpoise is considered a "high frequency cetacean" (Southall *et al.* 2007), and, therefore, is more sensitive to noise exposure at higher frequency spectra. Sounds produced during marine seismic surveys have most of their energy concentrated at the lower end of the frequency spectra, which is largely outside of the harbor porpoises' hearing threshold (Andersen 1970; Kastelein *et al.* 2002). Therefore, NMFS believes that it is scientifically justifiable to use received level at 120 dB as the threshold for behavioral harassment for harbor porpoises exposed to mid- and high-frequency Navy sonar, but it is not appropriate to use this received level as the threshold for behavioral harassment when exposed to seismic sounds.

Regarding its comment on bowhead disturbances when exposed to seismic sound at received level of 120 dB, AWL incorrectly cited the reference in Southall *et al.* (2007) as "a 2007 study." In fact, the reference in Southall *et al.* (2007) that AWL refers to was a conference abstract presented at the 1999 Meeting of the Acoustical Society of America by Richardson *et al.* (1999) titled "Displacement of Migrating Bowhead Whales by Sounds from Seismic Surveys in Shallow Waters of the Beaufort Sea." The study was conducted in the summer months between 1996 and 1998 in shallow waters of the Beaufort Sea, Alaska, during seismic surveys with 6–16 airguns and total volumes of 560–1,500 in³. As stated in the abstract, "[w]estward autumn migration of bowhead whales near and offshore of the exploration area was monitored by aerial surveys flown daily, weather permitting, during the three seasons. Aerial survey data from days with and without airgun operations were compared." The authors observed that "[m]ost bowheads avoided the area within 20 km of the operating airguns; bowheads were common there on days without airgun operations." In addition, the authors stated that bowhead whale "sighting rates just beyond the avoidance zone were higher on days with airgun operations. Broadband received levels of airgun pulses at 20 km were typically 120–130 dB re: 1 μ Pa (rms over pulse duration)." Based on this description, NMFS concludes that the displacement of bowhead whales by seismic surveys constitutes temporary avoidance behavior during "days with airgun operations," and these whales seem to avoid an area where received levels were about 120–130 dB. The authors did not state that they observed

"significant behavioral disturbance," nor did they report a disruption of behavioral patterns, either of which could be an indication of Level B harassment.

In addition, these minor course changes occurred during migration and have not been seen at other times of the year and during other activities. Therefore, NMFS does not believe that minor course corrections during a migration equate to "take" under the MMPA. This conclusion is based on controlled exposure experiments conducted on migrating gray whales exposed to the U.S. Navy's low frequency sonar (LFA) sources (Tyack 2009). When the source was placed in the middle of the migratory corridor, the whales were observed deflecting around the source during their migration. However, such minor deflection is considered not to be biologically significant. To show the contextual nature of this minor behavioral modification, recent monitoring studies of Canadian seismic operations indicate that when, not migrating, but involved in feeding, bowhead whales do not move away from a noise source at an SPL of 160 dB. Therefore, while bowheads may avoid an area of 20 km (12.4 mi) around a noise source, when that determination requires a post-survey computer analysis to find that bowheads have made a 1 or 2 degree course change, NMFS believes that does not rise to the level of a "take." NMFS therefore continues to estimate "takings" under the MMPA from impulse noises, such as seismic, as being at a distance of 160 dB (re 1 μ Pa) from the source. Although it is possible that marine mammals could react to any sound levels detectable above the ambient noise level within the animals' respective frequency response range, this does not mean that such animals would react in a biologically significant way.

Therefore, unless and until an improved approach is developed and peer-reviewed, NMFS will continue to use the 160-dB threshold for determining the level of take of marine mammals by Level B harassment for impulse noise (such as from airguns).

Comment 3: In reference to the impact analysis NMFS provided in the **Federal Register** notice for the proposed IHA (76 FR 30110; May 24, 2011), AWL states that the existing science does not support strictly distinguishing impulse and non-impulse noise, and that NMFS recognizes that over long distances (tens of kilometers), impulse sounds can become "stretched" out. Further, AWL refers to the peer-review panel report for this year's Open Water Meeting noting

that phenomenon and concluding that sounds from airguns “should not be treated as truly impulsive when received at ranges where sound propagation is known to remove the impulsive nature of these signals.” AWL concludes that “a uniform 160-dB harassment threshold is not justified by either the science or the standards imposed by the MMPA. And, without an appropriate threshold, NMFS cannot begin to accurately gauge the extent of marine mammal take from Statoil’s operations.”

Response: Although NMFS agrees with AWL that at long distances an impulse acoustic signal will lose its pulse feature by stretching its duration due to multipath propagation, these signals (or noises) are still fundamentally different from other non-impulse noise sources such as those from vibratory pile driving, drilling, and dredging based on the following characteristics:

First, the elongated pulse signals from the airgun array at far distances are caused by multipath propagation in a reverberant environment (Greene and Richardson 1988; Richardson *et al.* 1995; Madsen *et al.* 2002; Lurton 2002), which is different from other non-pulse signals at closer distances, which is composed of mostly direct sound. The reverberation part of the sound in the ocean behaves differently compared to the direct sound and early surface and bottom reflections from the perspective of the receiver. The direct sound and early reflections follow the inverse square law, with the addition of absorption effects in the case of early reflections, and so their amplitude varies with distance. However the reverberant part of the sound remains relatively constant up to a large distance with the position of the receiver. Therefore, as distance increases from the source, the component of reverberant sounds increases against the direct sound. In addition, the reverberant energy is less directional and is distributed more uniformly around the ambient environment of the animal. As shown in human psychoacoustics, these characteristics in a reverberant field provide distance cues to the listener as to how far away the source is located (Howard and Angus 2006). Therefore, at a distance where the airgun signals have been “stretched” to non-pulse, the receiving animals would be able to correctly perceive that these sounds are coming from far away, and would thus be less likely to be affected behaviorally as behavior responses are not solely dependent on received levels. Other factors such as distance to the source, movement of the source, source

characteristics, and the receiver’s (*i.e.*, animal’s) age, sex, motivation states, and prior experience, etc. probably play more significant roles in determining the responses of the animals that are being exposed to lower levels of noises than solely the received sound level.

Second, even though during horizontal propagation, the initial short pulse could be “stretched” from milliseconds when emitted to about 0.25–0.5 second long at a few kilometers in shallow water (Richardson *et al.* 1995), the noise duration is still very short when compared to those “conventional” non-pulse noise sources (vibratory pile driving, drilling, and dredging, etc.) for which NMFS applies a 120 dB threshold for assessing behavioral harassment. The empirical measurements of a 3,000 in³ airgun array received signal characteristics showed that its pulse duration was stretched to 0.2 second at approximately 1.3 km (0.8 mi), to 0.5 second at approximately 10 km (6.2 mi), and to about 1.8 seconds at 80 km (50 mi) from the source (O’Neill *et al.* 2011). Based on the airgun array’s firing rate of 0.1 Hz (1 shot every 10 seconds), the duty cycle was only 18% for the signal at 80 km (50 mi) (1.8 seconds on for every 10 seconds). Conversely, the “conventional” non-pulse noises from vibratory pile driving, drilling, and dredging typically last much longer (minutes to hours) with very brief (seconds for vibratory pile driving) intervals.

Therefore, NMFS does not agree that it is appropriate to treat elongated airgun pulses at long distances as a “conventional” non-pulse signal and apply the 120 dB behavioral response threshold to that sound source.

Comment 4: AWL states that NMFS’ approach to determining take for Statoil’s surveying during the bowhead fall migration is not supportable because the proposed authorization does not adequately take into account that Statoil’s fall surveying will take place within a migratory corridor. AWL argues that “by relying on density without sufficiently considering the overlap of ensonified areas, it assumes that migratory animals remain relatively stationary from one day to the next, despite Statoil’s operations exposing the same areas of the ocean to elevated sound level at very different times, days or even weeks apart.” AWL further states that “NMFS’ calculations are premised on the notion that a bowhead whale exposed, for example, on day 15 during the course of the survey remains stationary and is the same whale exposed when the vessel travels near the area again on day 23 during the

detailed survey, amounting to only a single harassed whale. Such a result does not reflect the reality of whales moving through the surveying area on their way to wintering grounds in the Bering Sea.” AWL points out that “in the past, NMFS has avoided this problem by calculating the ensonified area based on the amount of linear surveying line, rather than by extending the boundaries of the area to be surveyed.”

Response: NMFS does not agree with AWL’s statement that our take estimates for bowhead whales during Statoil’s shallow hazards survey in the Chukchi Sea are “not supportable.” First, evidence has shown that the bowhead whale fall migratory route through the Chukchi Sea is more spread out than in the Beaufort Sea, where whales tend to have a more confined migratory corridor due to ice conditions. In a recent satellite tagging study, Quakenbush *et al.* (2010) concluded from GPS data that bowhead whales do not spend much time in the north-central Chukchi Sea, near Statoil’s 2011 proposed shallow hazards survey. Kernel densities from the study showed that areas with the highest probability of bowhead use from September to December were near Point Barrow and the northeast Chukotka coast; the area along the east coast of Wrangel Island also had a moderate probability of use (Quakenbush *et al.* 2010). In addition, movements and behavior of tagged bowhead whales in this study indicated that the greatest potential for disturbance from industrial activities is near Point Barrow in September and October and in the lease area in September. Lastly, Statoil’s shallow hazards survey is scheduled to begin on August 1, 2011, and would require approximately 23 days to complete. Therefore, there is the potential for Statoil to complete their entire operation prior to the time when bowhead whales typically begin entering the Chukchi Sea in the fall (*i.e.*, mid-September). Thus NMFS determined that the marine mammal density data provided in Statoil’s IHA application for this period are overestimated. And to compensate for the overestimation due to the lower than actual density, NMFS opted not to consider overlaps of the ensonified area. Additionally, it should be noted that this is not the first time that this approach has been used in estimating takes from shallow hazards and 3D seismic surveys. When airgun activity, as part of a shallow hazards survey is ongoing continuously after ramping up, it is expected that nearly all bowhead whales would avoid the areas ensonified to >160 dB. This would

mean that migrating whales passing through the region would likely avoid the immediate area around the activities, and thus not be “taken” repeatedly by exposure to sounds >160 dB.

Alternatively, bowhead take numbers can be calculated based on the migratory animals’ daily average multiplied by the duration in days when seismic activities are ongoing, as was typically done to estimate bowhead whale takes in the Beaufort Sea during their migration. However, no such data are available for migratory bowheads in the Chukchi Sea, therefore, this method cannot be applied.

Regarding the method NMFS used to estimate the take by calculating the ensonified area based on the amount of linear surveying line, rather than by extending the boundaries of the area to be surveyed, this method is used for 2D seismic surveys where there is no overlapping ensonified area. Using this methodology to calculate for overlapping ensonified area would result in an unrealistically large area (in some cases, it could be larger than the entire Chukchi Sea) being treated as the affected area, which NMFS does not think is appropriate.

Comment 5: AWL states that NMFS must include the effects from all of Statoil’s equipment, not only the noise from the airguns (surveying) and ship thrusters (drilling). AWL points out that this year’s peer-review panel found that Statoil’s other acoustic sources are “relatively powerful and operate in the acoustic band of many if not most marine mammals.” AWL further states that although NMFS has proposed that Statoil conduct field measurements for all its equipment in order to determine whether additional safety zones are required, this cannot cure the failure to accurately determine in advance the number of marine mammals that may be harassed by Statoil’s activities. AWL states that NMFS should further consider the fact that Statoil’s two exploratory activities (surveying and drilling) may take place in close proximity to one another, each using a variety of noise-producing equipment that could contribute to adverse synergistic effects.

Response: NMFS agrees with AWL that all of Statoil’s active acoustic equipment must be included and analyzed for their potential effects on marine mammals. In its **Federal Register** notice of proposed IHA (76 FR 30110; May 24, 2011) and the SEA, NMFS provided a detailed description and analysis of these active acoustic sources. A list of these sources with their frequency bandwidth and

modeled/known maximum source level are provided in Table 1–3 of the SEA. These sources include the Kongsberg EA600 echosounder, GeoAcoustics 160D side-scan sonar, Kongsberg SBP300 sub-bottom profiler, Kongsberg EM2040 multibeam echosounder, and Kongsberg HIPAP 500. All these active sources are expected to have maximum source levels below those of the airgun array except the GeoAcoustics 160D side-scan sonar, of which the maximum source level is approximately 233 dB re 1 μ Pa @ 1m. However, since this equipment operates at frequencies of 114 and 410 kHz, the modeled isopleths drop down to 160 dB at about 453 and 108 m (1,486 and 354 ft) from the source, and to 120 dB at about 1,177 and 221 m (3,861.5 and 725 ft) from the source for each of these two frequencies, respectively, when high-frequency absorption is taken into consideration. These distances are well within the modeled 160 dB and 120 dB zones for the airgun array, which is at 2,250 m and 39,000 m (1.4 mi and 24 mi) for received levels of 160 and 120 dB, respectively. Therefore, the acoustic footprints from all other active sources are contained within that of the airgun array, and no additional take from these sources is expected.

Nevertheless, as mentioned by AWL and described in detail in the proposed IHA (76 FR 30110; May 24, 2011), Statoil will be required to conduct sound source verification (SSV) tests for all acoustic equipment used during the proposed shallow hazards survey. The empirical measurements will further show the presence or absence of low-frequency side-lobes and will be used to refine the exclusion zones, which are required for implementing monitoring and mitigation measures, as needed.

NMFS is aware of the relative locations of Statoil’s two exploratory activities (shallow hazards survey and geotechnical survey) and has conducted appropriate analyses concerning sources and impacts from both activities. These analyses are described in detail in the proposed IHA (76 FR 30110; May 24, 2011) and the SEA. Please refer to those documents for that discussion.

Mitigation Measures

Comment 6: AWL states that “NMFS should consider a safety zone specific to cow-calf pairs” to provide additional protective measures to address uncertainties regarding impacts on “bowhead cow-calf pairs and aggregations of whales.”

Response: Although it has been suggested that female baleen whales with calves “show a heightened response to noise and disturbance,”

there is no evidence that such “heightened response” is biologically significant and constitutes a “take” under the MMPA. Nevertheless, in the past NMFS has required a 120-dB safety zone for migrating bowhead cow/calf pairs to be implemented (see **Federal Register** notice for proposed IHA to Shell; 75 FR 22708; May 18, 2010). However, in the Chukchi Sea, the migratory corridor for bowhead whales is wider and more open, thus the 120-dB ensonified zone would not impede bowhead whale migration. The animals would be able to swim around the ensonified area. Additionally, NMFS has not imposed a requirement to conduct aerial monitoring of the 120-dB safety zone for the occurrence of four or more cow-calf pairs in the Chukchi Sea because it is not practicable. Especially for Statoil’s proposed shallow hazards survey, NMFS determined that monitoring the 120-dB zone of influence was not necessary in the Chukchi Sea because there would not be the level of effort by these surveys (*i.e.*, a small 120-dB zone of about 39,000 m radius). This provides cow/calf pairs with sufficient ability to move around the seismic source without significant effort.

Monitoring Measures

Comment 7: The Commission recommends that prior to granting the requested authorization, NMFS provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified Level B harassment zones.

Response: For this action, marine mammal monitoring serves two primary purposes. One purpose (referred to as mitigation monitoring) is to trigger mitigation measures—so that when a marine mammal is sighted within or entering the identified 180 or 190-dB exclusion zones, appropriate measures (speed/course change, power-down, or shutdown of sound sources) can be implemented, thus minimizing the likelihood that marine mammals are exposed to sound levels that have been associated with injurious effects. The other purpose is to collect data regarding the behavior and numbers of marine mammals detected within the larger 160-dB zone, which can be used both to refine Level B take estimates and to add to our understanding of the nature and scale of marine mammal behavioral responses to this activity. In the **Federal Register** notice for the proposed IHA (76 FR 30110; May 24, 2011), NMFS provided a thorough analysis of the proposed monitoring

measures and made a preliminary determination, based on the modality that is proposed to be utilized for monitoring, prior years' marine mammal visual monitoring measures as reported in the 90-day reports and comprehensive reports for seismic surveys in the Arctic, and the small exclusion zones (50 m [164 ft] from the source to where received levels would be at 190 dB and above, and 190 m [623 ft] from the source to where received levels would be at 180 dB and above) anticipated during the proposed Statoil shallow hazards surveys. The analysis led NMFS to conclude that the proposed monitoring program will be sufficient to detect, with a high level of confidence, nearly all marine mammals within or entering the identified 180 and 190 dB exclusion zone to implement mitigation measures to prevent Level A harassment (injury).

The identified Level B harassment zone for Statoil's proposed shallow hazards survey is modeled at 2,250 m (1.4 mi) from the source. This distance is believed to be within reasonable range for visual detection based on prior years' marine mammal monitoring during seismic surveys in the Arctic (Aerts *et al.* 2008; Hauser *et al.* 2008; Brueggeman 2009; Ireland *et al.* 2009; Reiser *et al.* 2010; 2011; Bles *et al.* 2011). In addition, NMFS worked with Statoil on the implementation of recommendations from the independent peer-review panel of Statoil's monitoring plan and included a list of monitoring measures recommended by the panel in the IHA. These measures that will increase detectability include: (1) Maximizing the time spent looking at the water and guarding the exclusion zones; (2) using "big eye" binoculars (*e.g.*, 25 x 150 power) from high perches on large, stable platforms; (3) pairing the use of "big eyes" with naked eye searching; and (4) using the best possible positions for observing (*e.g.*, outside and as high on the vessel as possible), taking into account weather and other working conditions. All these measures will further increase marine mammal detectability within and around the zones of influence for Level B harassment.

Although it may be difficult to detect *all* marine mammals that are within or entering the larger 160-dB Level B harassment zone, these observations will be corrected for animals undetected in the far field and used to refine post-activity take estimates, which are then reported in the 90-day report. Additionally, behavioral observations within this zone are reported and more generally contribute to our

understanding of how marine mammals behaviorally respond to seismic surveys.

Comment 8: AWL states that the IHA must prescribe the "means of effecting the least practicable impact" on a species or stock and its habitat, therefore, AWL argues, NMFS should also determine whether there are further monitoring methods available, such as manned or unmanned aerial surveys. Citing the peer-review panel report on open water monitoring plans, AWL states that other far-field monitoring, such as the use of scout vessels, passive acoustic platforms, and satellites, should be studied as well. AWL argues that "in order to mitigate for some of the difficulties that arise from relying on visual observation, NMFS should consider restricting airgun operations to times in which the safety zones are visible to marine monitors," and that "Statoil should not operate in conditions—such as darkness, fog, or rough seas—in which the observers are unable to ensure that the designated safety zones are free of marine mammals."

Response: During preparation of the SEA, NMFS considered several additional technologies that could be used to enhance marine mammal monitoring. These new technologies include the use of unmanned aerial vehicles (UAVs), passive acoustic monitoring (PAM), and active acoustic monitoring (AAM) for marine mammals. However, at this time, these technologies are still being developed or refined. For example, while there has been some testing of unmanned aerial vehicles conducted recently, the technology has not yet been proven effective for monitoring or mitigation, as would be required under an IHA.

Regarding the use of PAM, NMFS does not believe that at the current stage, requiring PAM (either towed or stationary) for real-time acoustic monitoring would yield reliable data (Guan *et al.* 2011). During the 2010 open-water seismic survey, Statoil tested a towed PAM for the presence of bowhead whales onboard a support vessel during the seismic operations, and preliminary results show that the detection rates were low (Bruce Martin, pers. comm. March 2011). As far as AAM is concerned, many technical issues (such as detection range and resolution) and unknowns (such as target strength of marine mammal species in the Arctic) remain to be resolved before it can be used as a reliable monitoring tool to aid in the implementation of mitigation measures. Environmental consequences concerning additional sound being introduced into the water column from

an active sonar source also need to be addressed. Therefore, NMFS does not believe it is beneficial to adopt these "emerging" monitoring technologies based on their current stages of research and development.

NMFS also considered AWL's suggestion of using scout vessels for monitoring marine mammals beyond the visual field where they can be detected by the source vessel. However, since the modeled exclusion zones at received levels of 180 and 190 dB re 1 μ Pa extend out to approximately 50 and 190 m (164 and 623 ft), respectively, NMFS determined that these distances are within the visual ranges that can be reliably detected by protected species observers (PSOs) onboard the source vessel. Therefore, NMFS does not believe it is beneficial to have additional scout vessels for marine mammal monitoring for this particular survey. Furthermore, deploying additional vessels in the vicinity of Statoil's proposed survey area would only increase anthropogenic impacts to the environment by introducing additional vessel noise into the water column. Concerning the manned aircraft survey, NMFS typically does not require this measure in the Chukchi Sea because it has been determined to be impracticable due to lack of adequate landing facilities and the prevalence of fog and other inclement weather in that area. This could potentially result in an inability to return to the airport of origin, thereby resulting in safety concerns.

NMFS recognizes the limitations of visual monitoring in darkness and other inclement weather conditions. Therefore, in Statoil's IHA, NMFS requires that no seismic airgun can be ramped up when the entire exclusion zones are not visible (*i.e.*, darkness or poor weather conditions). However, Statoil's operations will occur in an area where periods of darkness do not begin until early September. Beginning in early September, there will be approximately 1–3 hours of darkness each day, with periods of darkness increasing by about 30 min each day. By the end of the survey period, there will be approximately 8 hours of darkness each day. These conditions provide PSOs favorable monitoring conditions for most of the time.

Subsistence Issues

Comment 9: AEWG states that NMFS failed to consider adequately the potential impacts to the fall subsistence hunt of bowhead whales in Chukchi Sea villages. Over the past several years, worsening ice conditions have made it more dangerous and difficult for whale captains and their crews to carry out the

larger spring bowhead whale hunt. Because of the changing conditions, crews from Wainwright, Point Hope and Point Lay have all been conducting fall hunts in an effort to provide for their communities and meet their allotted quotas. Last year, Wainwright landed a bowhead whale for the first time during the fall, which provided critical food for the community and served as a great source of pride and celebration.

Response: NMFS does not agree with AEWC's contention that it failed to adequately consider impacts to the fall subsistence hunt. The potential impacts from the proposed Statoil survey were fully analyzed and addressed in both the **Federal Register** notice for the proposed IHA (76 FR 30110; May 24, 2011) and in the SEA. The proposed survey area is ~160 km (~100 mi) northwest of Wainwright offshore. Based on the small scale of the proposed shallow hazards survey, the radius of the modeled 160 dB isopleths is 2.25 km (1.4 mi) from the source, and the 120 dB isopleths is about 39 km (24 mi) from the source. Therefore, the area where the received level could reach 160 dB is approximately 140 km (87 mi) offshore. Subsistence whaling typically occurs nearshore. In the Chukchi Sea region, the fall hunt is generally conducted in an area that extends 16 km (10 mi) west of Barrow to 48 km (30 mi) north of Barrow. This is also confirmed by AEWC in its comment letter that "[s]ubsistence hunters have a limited hunting range and prefer to take whales close to shore so as to avoid hauling a harvested whale a long distance over which the whale could spoil. During the fall, however, subsistence hunters in the Chukchi Sea will pursue bowhead whales as far as 50 miles (80 km) from the coast in small, fiberglass boats." Therefore, it is highly unlikely that the fall subsistence hunt could be affected given the industry activities would occur much further offshore.

NEPA Concerns

Comment 10: AWL notes that NMFS is preparing a Programmatic EIS (PEIS), and that without a final EIS, additional oil and gas exploration in the Chukchi Sea is especially problematic given the critical information gaps that still exist today. AWL states that without information on the seasonal presence and distribution patterns of marine mammals, the agency would find it challenging to meet its obligations under the MMPA. AWL states that NMFS should refrain from issuing additional authorizations until more is known.

Response: While the Final EIS is still being developed, NMFS conducted a

thorough analysis of the affected environment and environmental consequences from seismic surveys in the Arctic in 2010 and prepared the 2010 EA specific to two open-water seismic activities by Shell and Statoil. For the issuance of an IHA to Statoil for its 2011 open-water shallow hazards survey, NMFS has determined that the information contained in the 2010 EA is adequate and that no significant changes relating to the environment and potential impacts from human activities have resulted since the 2010 EA, and that Statoil's proposed 2011 open-water shallow hazards surveys are essentially the same as the activities analyzed in the 2010 EA. Therefore, the 2010 EA is incorporated by reference in the 2011 SEA for the issuance of an IHA to Statoil for their open-water shallow hazards surveys in 2011.

While the analysis contained in the Final EIS will apply more broadly to Arctic oil and gas operations, NMFS' issuance of an IHA to Statoil for the taking of several species of marine mammals incidental to conducting its open-water shallow hazards survey in the Chukchi Sea in 2011, as analyzed in the SEA, is not expected to significantly affect the quality of the human environment. Statoil's surveys are not expected to significantly affect the quality of the human environment because of the limited duration and scope of operations. Additionally, the SEA and the 2010 EA contained a full analysis of cumulative impacts.

Miscellaneous Issues

Comment 11: AEWC states that in the past, they have remained in close communication with Statoil in the hopes that Statoil would be able to reach agreement with their whaling captains on a set of mitigation measures to protect subsistence whaling activities, but Statoil has been unwilling to enter into a Conflict Avoidance Agreement (CAA) with the impacted communities. In the absence of the signed CAA, AEWC requests that NMFS adopt, as mandatory requirements set forth in the IHA, the mitigation measures found in Titles II (Open Water Season Communications) and V (Avoiding Conflicts During the Open Water Season) of the 2011 CAA, which is attached with the AEWC comment letter.

Response: As NMFS has mentioned previously, the signing of a CAA is not a requirement to obtain an IHA. The CAA is a document that is negotiated between and signed by the industry participant, AEWC, and the Village Whaling Captains' Associations. NMFS has no role in the development or

execution of this agreement. Although the contents of a CAA may inform NMFS' no unmitigable adverse impact determination for bowhead and beluga whales, the signing of it is not a requirement. While a CAA has not been signed and a final version agreed to by industry participants, AEWC, and the Village Whaling Captains' Associations has not been provided, NMFS was provided with a copy of the version ready for signature by AEWC. NMFS has reviewed the CAA and included several measures from Titles II and V of the document which relate to marine mammals and avoiding conflicts with subsistence hunts in the IHA. Some of the conditions which have been added to the IHA include: (1) Avoiding concentrations of whales and reducing vessel speed when near whales; (2) conducting sound source verification measurements; and (3) participating in the Communication Centers. Despite the lack of a signed CAA for 2011 activities, NMFS is confident that the measures contained in the IHA (some of which were taken directly from the 2011 CAA) will ensure no unmitigable adverse impact to subsistence users.

In addition, Statoil has agreed to utilize the Wainwright communication center (Com-Center) in order to communicate with subsistence vessels during its 2011 operations. The Com-Center will be staffed by Inupiat operators where practicable. The Com-Center will be operated twenty-four (24) hours per day during the 2011 subsistence bowhead whale hunt. The Com-Center will have an Inupiat operator on duty 24 hours per day from August 15 until the end of the 2011 subsistence bowhead whale hunt and during Statoil's 2011 activities in the Chukchi Sea. The Com-Center will be managed and overseen by the Olgoonik-Fairweather JV. The Com-Center operators will be available to receive radio and telephone calls and to call vessels.

Following the completion of the 2011 Chukchi Sea open-water season and prior to the 2012 Preseason Introduction Meetings, Statoil, if requested by the AEWC or the Whaling Captains' Association of each village, will host a meeting in each of the following villages: Wainwright, Pt. Lay, Pt. Hope, and Barrow (or a joint meeting of the whaling captains from all of these villages if the whaling captains agree to a joint meeting) to review the results of the 2011 operations and to discuss any concerns residents of those villages might have regarding the operations. To the extent possible, the meetings will include the PSOs stationed on Statoil's vessels in the Chukchi Sea.

In summary, the measures that Statoil has taken, and will take, under the POC and Marine Mammal Monitoring and Mitigation Plan (4MP) are similar to the measures identified in the draft CAA provided by AEWC. Below, Statoil and NMFS identify the key conflict-avoidance provisions of the CAA, and identify the corresponding provisions of the POC, 4MP, and the Participation Agreement focused on minimizing impacts to the environment and subsistence resources in the Chukchi Sea.

Regarding AEWC's request for NMFS to adopt certain sections of the 2011 CAA as the mitigation measures (*i.e.*, Title II and Title V), NMFS carefully reviewed these sections and found that they are within the mitigation measures NMFS prescribed to Statoil under the IHA issued for mitigating subsistence harvest during Statoil's proposed shallow hazards surveys in the Chukchi Sea during the 2011 open-water season. However, these sections also contain requirements that NMFS does not believe are pertinent to Statoil's proposed 2011 open-water shallow hazards surveys. For instance, the draft CAA calls for funding of Com-Centers and to provide communication equipment in Deadhorse and Kaktovik, which are villages on the coast of the Beaufort Sea, far away from Statoil's planned Chukchi Sea operations. Therefore, NMFS does not believe it is appropriate to adopt these sections of the draft CAA in their entirety as mitigation measures for subsistence.

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 Marine Mammal Monitoring and Mitigation Plan (4MP) for Shallow Hazards and Site Clearance Surveys and Geotechnical Soil Investigations in the Alaskan Chukchi Sea, 2011. The panel met on March 9, 2011, and provided their final report to NMFS on April 27, 2011. The full panel report can be viewed at: <http://www.nmfs.noaa.gov/>

[pr/pdfs/permits/openwater/peer_review_report2011.pdf](http://www.nmfs.noaa.gov/pr/pdfs/permits/openwater/peer_review_report2011.pdf).

NMFS provided the panel with Statoil's 4MP and asked the panel to address the following questions and issues for Statoil's plan:

(1) Are the applicant's stated objectives the most useful for understanding impacts on marine mammals and otherwise accomplishing the goals stated in the paragraph above?

(2) Are the applicant's stated objectives able to be achieved based on the methods described in the plan?

(3) Are there techniques not proposed by the applicant, or modifications to the techniques proposed by the applicant, that should be considered for inclusion in the applicant's monitoring program to better accomplish the goals stated above?

(4) What is the best way for an applicant to present their data and results (formatting, metrics, graphics, etc.) in the required reports that are to be submitted to NMFS?

Section 4 of the report contains recommendations that the panel members felt were applicable to all of the monitoring plans that they reviewed this year. Section 5.1 of the report contains recommendations specific to Statoil's 2011 shallow hazards survey monitoring plan. Specifically, for the general recommendations, the panel commented on issues related to:

(1) Acoustic effects of oil and gas exploration—assessment and mitigation; (2) aerial surveys; (3) marine mammal observers; (4) visual near-field monitoring; (5) visual far-field monitoring; (6) baseline biological and environmental information; (7) comprehensive ecosystem assessments and cumulative impacts; (8) duplication of seismic survey effort; (9) improving take estimates and statistical inference into effects of the activity; and (10) improving the peer-review process.

NMFS has reviewed the report and evaluated all recommendations made by the panel. NMFS has determined that there are several measures that Statoil can incorporate into its 2011 open-water shallow hazards surveys 4MP to improve it. Additionally, there are other recommendations that NMFS has determined would also result in better data collection and could potentially be implemented by oil and gas industry applicants, but which likely could not be implemented for the 2011 open-water season due to technical issues (see below). While it may not be possible to implement those changes this year, NMFS believes that they are worthwhile and appropriate suggestions that may require a bit more time to implement, and Statoil should consider

incorporating them into future monitoring plans should Statoil decide to apply for IHAs in the future.

The following subsections lay out measures that NMFS recommends for implementation as part of the 2011 open-water shallow hazards surveys 4MP and those that are recommended for future programs, as well as recommendations for future MMPA authorization applications and presentations at future Open Water Meetings. The panel recommendations determined by NMFS that are appropriate for inclusion in the 2011 program have been discussed with Statoil and are included in the IHA.

Recommendations for Inclusion in the 2011 4MP and IHA

- Section 4.3 of the report contains several recommendations regarding marine mammal observers (PSOs). NMFS agrees that the following measures should be incorporated into the 2011 Monitoring Plan:
 - PSOs record additional details about unidentified marine mammal sightings, such as "blow only", mysticete with (or without) a dorsal fin, "seal splash", etc. That information should also be included in 90-day and final reports.

- In Section 4.7, panelists included a section regarding the need for a more robust and comprehensive means of assessing the collective or cumulative impact of many of the varied human activities that contribute noise into the Arctic environment. Specifically, for data analysis and integration, the panelists recommended, and NMFS agrees, that the following recommendations be incorporated into the 2011 program:
 - To better assess impacts to marine mammals, data analysis should be separated into periods when a seismic airgun array (or a single mitigation airgun) is operating and when it is not. Final and comprehensive reports to NMFS should summarize and plot:
 - Data for periods when a seismic array is active and when it is not; and
 - The respective predicted received sound conditions over fairly large areas (tens of km) around operations.

- To better understand the potential effects of oil and gas activities on marine mammals and to facilitate integration among companies and other researchers, the following data should be obtained and provided electronically in the final and comprehensive reports:
 - The location and time of each aerial or vessel-based sighting or acoustic detection;
 - Position of the sighting or acoustic detection relative to ongoing operations

(i.e., distance from sightings to seismic operation, drilling ship, support ship, etc.), if known;

- The nature of activities at the time (e.g., seismic on/off);

- Any identifiable marine mammal behavioral response (sighting data should be collected in a manner that will not detract from the PSO's ability to detect marine mammals); and

- Any adjustments made to operating procedures.

- In Section 4.9, the panelists discussed improving take estimates and statistical inference into effects of the activities. NMFS agrees that the following measures should be incorporated into the 2011 Monitoring Plan:

- Reported results from all hypothesis tests should include estimates of the associated statistical power when practicable.

- Estimate and report uncertainty in all take estimates. Uncertainty could be expressed by the presentation of confidence limits, a minimum-maximum, posterior probability distribution, etc.; the exact approach would be selected based on the sampling method and data available.

- Section 5.1 of the report contains recommendations specific to Statoil's 2011 shallow hazards survey monitoring plan. Of the recommendations presented in this section, NMFS has determined that the following should be implemented for the 2011 season:

- Conduct sound source verification for the sub-bottom profilers.

- The report should clearly compare authorized takes to the level of actual estimated takes.

- As a starting point for integrating different data sources, Statoil should present their 2010 and 2011 data by plotting acoustic detections from bottom-mounted hydrophones and visual detections from PSOs on a single map.

- In addition, the panelists included a list of general recommendations from the 2010 Peer-review Panel Report to be implemented by operators in their 2011 open-water season activities. NMFS agrees that the following recommendations should be implemented in Statoil's 2011 monitoring plan:

- Observers should be trained using visual aids (e.g., videos, photos), to help them identify the species that they are likely to encounter in the conditions under which the animals will likely be seen.

- Observers should understand the importance of classifying marine mammals as "unknown" or "unidentified" if they cannot identify

the animals to species with confidence. In those cases, they should note any information that might aid in the identification of the marine mammal sighted (and this information should be included in the report). For example, for an unidentified mysticete whale, the observers should record whether the animal had a dorsal fin.

- Observers should attempt to maximize the time spent looking at the water and guarding the safety radii. They should avoid the tendency to spend too much time evaluating animal behavior or entering data on forms, both of which detract from their primary purpose of monitoring the safety zone.

- "Big eye" binoculars (e.g., 25 x 150 power) should be used from high perches on large, stable platforms. They are most useful for monitoring impact zones that extend beyond the effective line of sight. With two or three observers on watch, the use of big eyes should be paired with searching by naked eye, the latter allowing visual coverage of nearby areas to detect marine mammals. When a single observer is on duty, the observer should follow a regular schedule of shifting between searching by naked eye, low-power binoculars, and big-eye binoculars based on the activity, the environmental conditions, and the marine mammals of concern.

- Observers should use the best possible positions for observing (e.g., outside and as high on the vessel as possible), taking into account weather and other working conditions.

- Observer teams should include Alaska Natives, and all observers should be trained together. Whenever possible, new observers should be paired with experienced observers to avoid situations where lack of experience impairs the quality of observations.

- Conduct efficacy testing of night-vision binoculars and other such instruments to improve near-field monitoring under Arctic conditions.

- To help evaluate the utility of ramp-up procedures, PSOs shall record, analyze, and report their observations during any ramp-up period.

- PSOs should carefully document visibility during observation periods so that total estimates of take can be corrected accordingly.

Recommendations for Inclusion in Future Monitoring Plans

In Section 4.7 of the report, the panelists stated that advances in integrating data from multiple platforms through the use of standardized data formats are needed to increase the statistical power to assess potential effects. Therefore, the panelists

recommended that industry examine this issue and jointly propose one or several data integration methods to NMFS at the Open Water Meeting in 2012. NMFS concurs with the recommendation and encourages Statoil to collaborate with other companies to discuss data integration methods and to present the results of those discussions at the 2012 Open Water Meeting.

In Section 4.7, the panel also recommended that Statoil's reports include sightability curves (detection functions) for distance-based analyses to help evaluate the effectiveness of PSOs and more effectively estimate take. NMFS discussed this requirement with Statoil on a technical basis and realizes that in most circumstances there are often too few sightings of individual species recorded during a single project to allow reliable estimates of sightability curves. Therefore, sightability curves from previous comprehensive reports (where multi-year or multi-project data have been pooled to achieve adequate sample sizes) are often used and referenced in 90-day reports. Whenever future monitoring data present enough data from a single project, sightability curves will be provided in the report.

In Section 5.1, the panel recommended that Statoil consider other new technologies (i.e., underwater vehicles, satellite monitoring, etc.) to assess far-field monitoring. The panel also recommended investigating other methods for far-field monitoring (e.g., unmanned systems or scout vessels) to be implemented upon approval by NMFS. NMFS agrees that new technologies should be considered to increase our current knowledge regarding marine mammals that could be affected beyond the line of sight from the vessel platform and will discuss this issue with the industry at the 2012 Open Water Meeting.

The panel also recommended using the cluster array to localize whale calls and evaluate the effects of sound on calling animal distribution. However, based on the limited usefulness of data collected on the cluster array last year (2010 open-water season), the areas where the recording arrays were previously used for localizing whales have been expanded to cover a much larger area in 2011, which also include the Hanna Shoal area to potentially capture more information on whale migration.

If more recording arrays are available in the future, NMFS will work with Statoil to deploy these arrays within the proposed project area for localizing calling whales.

Recommendations for Future Applications and Open Water Meetings

In Section 3, panelists recommended that companies specifically report the changes they made in their operations as a result of the previous years' panel recommendations. These should be highlighted in the verbal presentations at the Open Water Meeting, discussed directly with the review panel, and detailed in the 90-day reports (and final reports, if appropriate). NMFS concurs with this recommendation and requests that Statoil include this information in their 90-day report submitted at the conclusion of operations and provide the information in their presentation at the 2012 Open Water Meeting.

In Section 4.1, panelists made a recommendation that IHA holders should report estimates of the spatio-temporal distributions of acoustic levels. This could include reporting levels as low as the 120 dB level. NMFS agrees that applicants should include this information in future MMPA application requests.

In Section 4.7, panelists included a recommendation that could be helpful for the presentation of data at future Open Water Meetings. To allow visualization and interpretation of the complex field of anthropogenic activities and distributions and movements of marine mammals, the final and comprehensive reports required by the IHA should provide all spatial data on figures that depict the locations of the principal sound sources. This could be represented by a diagram in which all PSO sightings (vessel-based and aerial) and acoustic detections are plotted relative to their distance and bearing from a specific sound source. Alternatively, it could be depicted in a map of the region, showing the operation area, tracklines of vessels and aircraft (if applicable), PSO sightings (vessel-based and aerial), and acoustic detections. To facilitate understanding of both the spatial and temporal aspects of the activity and marine mammal responses, these figures would ideally be animated, showing industry activities and sightings or acoustic detections changing through time. Whenever ancillary biological data (e.g., tagging, acoustic, broad-scale aerial survey) are available that are coincident in space and time with the activity, they should be included in these figures. NMFS encourages Statoil to consider this recommendation when preparing figures and videos for reports and the Open Water Meeting.

Recommendations From 2010 Peer-Review Panel for Inclusion in Future Monitoring Plans

Section 3.5 of the 2010 Peer-review Panel report recommends methods for conducting comprehensive monitoring of a large-scale seismic operation. The panelists recommend adding a tagging component to monitoring plans. "Tagging of animals expected to be in the area where the survey is planned also may provide valuable information on the location of potentially affected animals and their behavioral responses to industrial activities. Although the panel recognized that such comprehensive monitoring might be difficult and expensive, such an effort (or set of efforts) reflects the complex nature of the challenge of conducting reliable, comprehensive monitoring for seismic or other relatively-intense industrial operations that ensconce large areas of ocean". While this particular recommendation is not feasible for implementation in 2011, NMFS recommends that Statoil consider adding a tagging component to future monitoring plans should Statoil decide to conduct such activities in future years.

Finally, the panel recommended that sightings be entered and archived in a way that enables immediate geospatial depiction to facilitate operational awareness and analysis of risks to marine mammals. Real-time monitoring is especially important in areas of seasonal migration or influx of marine mammals. NMFS worked with Statoil and the panel to identify certain software packages for real-time data entry, mapping, and analysis available for this purpose, but it does not seem that a commercially viable software system is available at this time.

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' jurisdiction most likely to occur near operations in the Chukchi Sea 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 (*Histiophoca 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. On December 10, 2010, NMFS published a notification of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notification of proposed threatened and not warranted status for subspecies and distinct population segments of the bearded seal (75 FR 77496) in the **Federal Register**. Neither species is considered depleted under the MMPA. The polar bear (which is listed as threatened under the ESA) and walrus also occur in the Chukchi Sea. However, both species are under the jurisdiction of the U.S. Fish and Wildlife Service and are therefore not discussed further in this document.

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. The Notice of Proposed IHA (76 FR 30110; May 24, 2011) included a discussion of the effects of airguns on marine mammals, which is not repeated here. That discussion did not take into consideration the monitoring and mitigation measures proposed by Statoil and NMFS. No cases of temporary threshold shift (TTS) are expected as a result of Statoil's 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 required to be implemented during the survey described later in this document. Based on the fact that the sounds produced by Statoil's operations are unlikely to cause TTS in marine mammals, it is extremely unlikely that permanent hearing impairment would result. No injuries or mortalities are anticipated as a result of Statoil's operations, and none are authorized to occur. Only Level B harassment is anticipated as a result of Statoil's activities.

Potential Effects From Active Sonar Equipment on Marine Mammals

Several active acoustic sources other than the four 10 in³ 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) were provided in the Notice of Proposed IHA (76 FR 30110; May 24, 2011). 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. 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. The Notice of Proposed IHA (76 FR 30110; May 24, 2011) contains a discussion of impacts to marine mammals from vessel sounds, which is not repeated here.

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 capelin 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 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.

Mitigation Measures

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 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 Statoil's open-water shallow hazards survey in the Chukchi Sea, Statoil worked with NMFS and agreed upon 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 has been modified based on comments received from the peer review panel (see the “Monitoring Plan Peer Review” section earlier in this document).

For Statoil’s 2011 open-water shallow water hazards surveys in the Chukchi Sea, the following mitigation measures are required.

(1) Sound Source Measurements

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 exclusion 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 × 10³) and the operation of a single 10 in³ 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 exclusion 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 submitted to NMFS as part of the 90-day report following completion of the acoustic program.

(2) Exclusion Zones

Under current NMFS guidelines, “exclusion zones” 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 criteria are based on an assumption that SPLs received at levels lower than these will not injure these animals or impair their hearing abilities, but that at higher levels they 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 exclusion zones (Richardson *et al.* 1995).

Initial exclusion and disturbance zones for the sound levels produced by

the planned airgun configurations have been estimated (Table 1). These zones 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-in³ airguns (total discharge volume of 40 in³) and a single 10 in³ airgun. Underwater sound propagation from a similar 4 × 10-in³ airgun cluster and single 10 in³ 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 in³ airgun cluster and RL = 204.4 – 16.0LogR – 0.00082R for the single 10 in³ airgun (where RL = received level and R = range). The estimated distances for the 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 exclusion zones. The field report will be made available to NMFS and the PSOs 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 IN³ AIRGUN CLUSTER AND A SINGLE 10-IN³ 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 PSOs FOR MITIGATION PURPOSES UNTIL AN SSV IS COMPLETED IN 2011

Received levels (dB re 1 µPa rms)	Distance (m)			
	Airgun cluster (4 x 10 ³)		Single airgun (1 x 10 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 exclusion zone and, based on its position and the relative motion, is likely to enter the exclusion 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 Statoil's 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 applicable exclusion zone. If the mammal appears likely to enter the exclusion zone, further mitigative actions will be taken, including a power down or shut down of the airgun(s).

In addition, Statoil vessels are required to comply with the following conditions concerning their speed with their relation of distances to whales:

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

(4) Power Downs

A power down for immediate mitigation purposes is the immediate reduction in the number of operating airguns such that the exclusion zones of the 190 dB_{rms} and 180 dB_{rms} areas are decreased to the extent that an observed marine mammal(s) are not in the applicable exclusion 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 exclusion zone of the full array but is outside the applicable exclusion zone of the single mitigation airgun. Likewise, if a mammal is already within the exclusion zone when first detected, the airguns will be powered down immediately. If a marine mammal is sighted within or about to enter the applicable exclusion zone of the single 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 exclusion zone. The animal will be considered to have cleared the exclusion zone if it:

- Is visually observed to have left the exclusion 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 exclusion zone, 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 exclusion zone around the single 10 in³ airgun while it is operating during a power down. Airgun activity will not resume until the marine mammal has cleared the exclusion zone. The animal will be considered to have cleared the exclusion zone as described above under power down procedures.

A shut down of the borehole drilling equipment may be requested by PSOs 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 airguns 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 exclusion zone. Given the small size of the planned airgun array, it is estimated that period would 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 exclusion zone by PSOs to ensure that no marine mammals are present. The entire exclusion zone must be visible during the 30-minute lead-in to a full ramp up. If the entire exclusion zone is not visible, then ramp up from a cold start cannot begin. If a marine mammal(s) is sighted within the exclusion 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 exclusion 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 exclusion zone required for a cold start. PSOs 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 hr/day until mid-August, so until that date PSOs will automatically be observing during the 30-minute period preceding a ramp up. Later in the season, PSOs will be called to duty at night to observe prior to and during any ramp ups. The survey operator and PSOs will maintain records of the times when ramp-ups start and when the airgun arrays reach full power.

(7) Mitigation Measures Concerning Baleen Whale Aggregations

A 160-dB vessel monitoring zone for large whales will be established and monitored in the Chukchi Sea during all

shallow hazards surveys. Whenever a large number 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 exclusion zone around the survey operations, the survey activity will not commence or will shut down, until no more than 12 whales are present within the 160-dB exclusion zone of shallow hazards surveying operations.

(8) 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.

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 and proposed by the independent peer review panel, NMFS has 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.

Monitoring and Reporting Measures

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

The following monitoring measures are required for Statoil's 2011 open-water shallow hazards surveys in the Chukchi Sea.

(1) Vessel-Based PSOs

Vessel-based monitoring for marine mammals will be done by trained PSOs throughout the period of marine survey activities. PSOs 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. PSO 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 PSOs 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 PSO; and (3) maximum of 12 hours of watch time per day per PSO.

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

Observer teams shall include Alaska Natives, and all observers shall be trained together. Whenever possible, new observers shall be paired with experienced observers to avoid situations where lack of experience impairs the quality of observations.

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, 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 [NVDs], 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.

Observers should be trained using visual aids (e.g., videos, photos), to help them identify the species that they are likely to encounter in the conditions under which the animals will likely be seen.

Observers should attempt to maximize the time spent looking at the water and guarding the exclusion radii. They should avoid the tendency to spend too much time evaluating animal behavior or entering data on forms, both of which detract from their primary purpose of monitoring the exclusion zone.

Observers should use the best possible positions for observing (e.g., outside and as high on the vessel as possible), taking into account weather and other working conditions.

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 PSOs in watching for marine mammals.

Information to be recorded by PSOs 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 PSO, 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;

(C) The positions of other vessel(s) in the vicinity of the PSO location;

(D) Any identifiable marine mammal behavioral response (sighting data should be collected in a manner that

will not detract from the PSO's ability to detect marine mammals);

(E) any adjustments made to operating procedures; and

(F) observations during any ramp-up period.

Observers should understand the importance of classifying marine mammals as “unknown” or “unidentified” if they cannot identify the animals to species with confidence. In those cases, they should note any information that might aid in the identification of the marine mammal sighted (and this information should be included in the report). For example, for an unidentified mysticete whale, the observers should record whether the animal had a dorsal fin.

Additional details about unidentified marine mammal sightings, such as “blow only”, mysticete with (or without) a dorsal fin, “seal splash”, etc., shall be recorded. That information should also be included in 90-day and final reports.

PSOs should carefully document visibility during observation periods so that total estimates of take can be corrected accordingly.

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 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).

Conduct efficacy testing of night-vision binoculars and other such instruments to improve near-field monitoring under Arctic conditions and compare with the 2010 monitoring results.

(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 exclusion 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 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 in³) and the operation of a single 10 in³ airgun that will be used during power downs or very shallow penetration surveys.

2011 Joint Environmental Studies Program

Statoil, Shell Offshore, Inc. (Shell), and 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 general background soundscape data, industrial sounds, and marine mammal call data across the lease area. From previous deployments of these recordings, industry has 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.

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 and the airgun array, 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 exclusion 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 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. 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) To better assess impacts to marine mammals, data analysis should be separated into periods when a seismic airgun array (or a single mitigation airgun) is operating and when it is not. Final and comprehensive reports to NMFS should summarize and plot:

- Data for periods when a seismic array is active and when it is not; and
- The respective predicted received sound conditions over fairly large areas (tens of km) around operations;

(e) 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;

(f) Reported results from all hypothesis tests should include estimates of the associated statistical power when practicable;

(g) Estimate and report uncertainty in all take estimates. Uncertainty could be expressed by the presentation of confidence limits, a minimum-maximum, posterior probability distribution, etc.; the exact approach would be selected based on the sampling method and data available;

(h) The report should clearly compare authorized takes to the level of actual estimated takes; and

(i) As a starting point for integrating different data sources, Statoil should present their 2010 and 2011 data by plotting acoustic detections from bottom-mounted hydrophone and visual detections from MMOs on a single map.

(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, 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 is requiring Statoil to 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 in the Notice of Proposed IHA (76 FR 30110; May 24, 2011). The potential effects of sound from the 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) is highly unlikely to occur based on the required 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 shallow hazards 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 the dynamic positioning 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 findings. Statoil provided a full description of the methodology used to estimate takes by harassment in its IHA application (see **ADDRESSES**), which was also provided in the Notice of Proposed IHA (76 FR 30110; May 24, 2011). A summary of that information is provided here, as it has not changed from the proposed notice.

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 (*Histiophoca 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 1 μPa. 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 1 μPa.

As described earlier in the document, a 4 × 10 in³ 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). For use in estimating potential harassment takes in this application, as well as for mitigation radii to be implemented by PSOs 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 (1.4 mi) from the source. Adding a 2.25 km (1.4 mi) perimeter to the two site survey areas results in an estimated area of 1,037 km² 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 (328 ft) 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 (4.7 mi). Buffering 4 core sites spaced 100 m (328 ft) apart with the 7.5 km (4.7 mi) 120 dB distance results in a total area of 180 km². The total area exposed to sounds ≥ 120 dB by soil investigations at the 8 prospective drilling locations will therefore be 1,440 km².

The following subsections summarize 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 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).

Tables 2 and 3 present the expected densities of marine mammals in the planned survey area for both open-water and ice-margin habitat in the summer and fall seasons, respectively.

(1) Cetaceans

Eight species of cetaceans are known to occur in the Chukchi Sea area of the Statoil project. Only four of these (bowhead, beluga, and gray whales, and harbor porpoise) are likely to be encountered during the 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). 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. Effort and sightings reported by Clarke and Ferguson (in prep.) were used to calculate the average open-water density estimate.

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). 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). 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 relatively 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 average density (#/km ²)	Ice margin 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 average density (#/km ²)	Ice margin 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
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. 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. 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. 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 $0.0003/\text{km}^2$ to $0.0044/\text{km}^2$ with a maximum 95 percent CI of $0.0419/\text{km}^2$. 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. 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. 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. 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).

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 $0.0008/\text{km}^2$ to $0.0015/\text{km}^2$ with a maximum 95 percent CI of $0.0079/\text{km}^2$ (Haley *et al.* 2010). The

average of those three years ($0.0011/\text{km}^2$) was used as the average open-water density estimate while the high value ($0.0015/\text{km}^2$) 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 $0.0002/\text{km}^2$ to $0.0010/\text{km}^2$ with a maximum 95 percent CI of $0.0093/\text{km}^2$. The average of those three years ($0.0001/\text{km}^2$) was again used as the average density estimate and the high value $0.0011/\text{km}^2$ 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 $\frac{3}{4}$ 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 $\frac{2}{3}$ 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.

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.

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 $0.0005/\text{km}^2$ 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 ensounded 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, NMFS has 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				Total
	Summer		Fall		
	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				Total
	Summer		Fall		
	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

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—Continued

Species	Number of individuals exposed to sound levels ≥ 120 dB				Total
	Summer		Fall		
	Open water	Ice margin	Open water	Ice margin	
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 and 120 dB criteria, the average estimates of the numbers of individual cetaceans exposed to received levels higher than these sound pressure levels 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 μ Pa 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 and 120 dB_{rms} re 1 μ Pa during the proposed shallow hazards survey and geotechnical soil investigation 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 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 authorized. In addition, these surveys would use a small 40 in³ 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 (1.4 mi) from the airgun 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 μ Pa. 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 soil investigations, NMFS considers that at received levels ≥ 120 dB re $1 \mu\text{Pa}$, 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 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 $1 \mu\text{Pa}$, which is below what NMFS uses to assess Level A harassment of received levels at 180 dB for cetaceans and 190 dB for pinnipeds. Therefore, no hearing impairment is anticipated. In addition, the duration of the entire geotechnical soil investigation is approximately 14 days, and DP will only be running sporadically when needed to position the vessel. In addition, the soil investigation operations are expected to be stationary, with limited area to be ensonified. Therefore, the impacts to marine mammals in the vicinity of the soil investigation operations are expected to be in short duration and localized.

Taking into account the mitigation measures that are required to be implemented, 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 PSOs, 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 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 determined that the exposure of pinnipeds to sounds produced by the 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 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 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. On December 10, 2010, NMFS published a notification of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notification of proposed threatened and not warranted status for subspecies and distinct population segments of the bearded seal (75 FR 77496) in the **Federal Register**. Neither species is considered depleted under the MMPA. The listing for these species is not anticipated to be completed prior to the end of this proposed seismic survey. 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 authorized takes 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) required in the IHA 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 finds that Statoil's 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, walrus, 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.

Bowhead whales, belugas, and walrus are the marine mammal species primarily harvested during the time of Statoil's shallow hazards 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. 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 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 and 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 discussed 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. Additionally, Statoil's mobilization date is after the usual completion date of the spring beluga hunt in Kasegaluk Lagoon (*i.e.*, July 15 for end date of the hunt).

(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 during 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 Wainwright 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 Wainwright, 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 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 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 shallow hazards survey activities, as described earlier in the document, the 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 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 developed a POC for the 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 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 March 21, 2011.

Based upon these meetings, a final POC that documents all consultations with community leaders, subsistence user groups, individual subsistence users, and community members was submitted to NMFS on July 14, 2011. Subsistence mitigation measures that Statoil will implement during the shallow hazards survey program were described in the Mitigation Measures section earlier in this document.

Unmitigable Adverse Impact Analysis and Determination

NMFS has 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 determination is supported by information contained in this document and Statoil's 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, if they are still ongoing. 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 shallow hazards survey site. Because the whales are migrating westward from the Canadian Beaufort Sea, they will reach Barrow before entering the area of Statoil's activities. 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 shallow hazards survey area.

Based on the measures described in Statoil's POC, mitigation and monitoring measures (described earlier in this document), and the project design itself, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses of marine mammals 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 project area: The bowhead, humpback, and fin whales. NMFS' Permits, Conservation and Education Division consulted 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. A Biological Opinion was issued on July 22, 2011, which concludes that issuance of an IHA is not likely to jeopardize the continued existence of the fin, humpback, or bowhead whale. NMFS has issued an Incidental Take Statement under this Biological Opinion which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of listed species.

National Environmental Policy Act (NEPA)

In 2010, NMFS prepared an EA and issued FONSI 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 those analyzed in 2010. Therefore, NMFS has prepared 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. A FONSI was issued for this action on July 21, 2011. Therefore, preparation of an EIS is not necessary.

Authorization

As a result of these determinations, NMFS has issued an IHA to Statoil to take marine mammals incidental to its 2011 open-water shallow hazards and geotechnical surveys in the Chukchi Sea, Alaska, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: July 28, 2011.

Helen Golde,

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

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XA571

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Coastal Commercial Fireworks Displays at Monterey Bay National Marine Sanctuary, CA

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

ACTION: Notice; receipt of application for letter of authorization; request for comments and information.

SUMMARY: NMFS has received a request from the Monterey Bay National Marine Sanctuary (MBNMS or sanctuary) for authorization to take small numbers of marine mammals incidental to permitting professional fireworks displays within the sanctuary in California waters, over the course of five years, from July 4, 2012 to July 3, 2017. Pursuant to regulations implementing the Marine Mammal Protection Act (MMPA), NMFS is announcing receipt of MBNMS's request for the development and implementation of regulations governing the incidental taking of marine mammals and inviting information, suggestions, and comments on MBNMS's application and request.

DATES: Comments and information must be received no later than September 2, 2011.

ADDRESSES: Comments on the application should be addressed to P. Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3225. The mailbox address for providing e-mail comments is ITP.Laws@noaa.gov. Comments sent via e-mail, including all attachments, must not exceed a 10-megabyte file size.

FOR FURTHER INFORMATION CONTACT: Ben Laws, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Availability

A copy of MBNMS's application may be obtained by writing to the address specified above (see **ADDRESSES**), telephoning the contact listed above (see **FOR FURTHER INFORMATION CONTACT**), or visiting the Internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>.

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce (Secretary) 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) if certain findings are made and regulations are issued or, if the taking is limited to harassment, notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings may 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 certain subsistence uses, and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such taking 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." 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

On April 28, 2011, NMFS received a complete application from MBNMS requesting authorization for take of two species of marine mammals incidental to coastal fireworks displays conducted at MBNMS under permits issued by MBNMS. NMFS first issued an incidental harassment authorization (IHA) to MBNMS on July 4, 2005 (70 FR 39235; July 7, 2005), and subsequently issued 5-year regulations governing the annual issuance of Letters of Authorization under section 101(a)(5)(A) of the MMPA (71 FR 40928; July 19, 2006). Upon expiration of those regulations, NMFS issued MBNMS an IHA (76 FR 29196; May 20, 2011), which expires on July 3, 2012. The requested regulations would be valid from July 4, 2012 until July 3, 2017. Marine mammals would be exposed to