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Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to an Exploration Drilling Program Near Camden Bay, Beaufort Sea, Alaska; Notice

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA804

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to an Exploration Drilling Program Near Camden Bay, Beaufort Sea, Alaska

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

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to Shell Offshore Inc. (Shell) to take marine mammals, by harassment, incidental to offshore exploration drilling on Outer Continental Shelf (OCS) leases in the Beaufort Sea, Alaska.

DATES: Effective July 1, 2012, through October 31, 2012.

ADDRESSES: A copy of the issued IHA, application with associated materials, and NMFS' Environmental Assessment (EA) and Finding of No Significant Impact may be obtained by writing to Tammy Adams, Acting Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910, telephoning the contact listed below (see **FOR FURTHER INFORMATION CONTACT**), or visiting the internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Candace Nachman, Office of Protected Resources, NMFS, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Background

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

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

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

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

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

Summary of Request

NMFS received an application on May 10, 2011, from Shell for the taking, by harassment, of marine mammals incidental to offshore exploration drilling on OCS leases in the Beaufort Sea, Alaska. NMFS reviewed Shell's application and identified a number of issues requiring further clarification. After addressing comments from NMFS, Shell modified its application and submitted a revised application on September 2, 2011. NMFS carefully evaluated Shell's application, including their analyses, and deemed the application complete. The September 2, 2011, application was the one available for public comment (see **ADDRESSES**) and considered by NMFS for this IHA. NMFS published a Notice of Proposed IHA in the **Federal Register** on November 7, 2011 (76 FR 68974). That notice contained in depth descriptions and analyses that are generally not repeated in this document. Only in cases where descriptions or analyses changed is that information updated here. The most notable changes include: (1) The description of the sound characteristics of the drillship *Kulluk* based on the installation of quieting technologies; (2) modifications to the acoustic and aerial monitoring programs presented in the marine mammal monitoring plan; (3) take estimates from exposure to sound from the *Kulluk* with the reduced sound isopleths based on the installation of quieting technologies; and (4) updated information regarding Shell's Oil Spill Response Plan (OSRP). These changes are described in greater detail in the applicable sections later in this document.

Shell plans to drill two exploration wells at two drill sites in Camden Bay, Beaufort Sea, Alaska, during the 2012 Arctic open-water season (July through October). Impacts to marine mammals may occur from noise produced by the drillship, zero-offset vertical seismic profile (ZVSP) surveys, and supporting vessels (including icebreakers) and aircraft. Shell requested authorization to take nine marine mammal species by Level B harassment. However, narwhals (*Monodon monoceros*) are not expected to be found in the activity area. Therefore, NMFS has authorized take of eight marine mammal species, by Level B harassment, incidental to Shell's offshore exploration drilling program in Camden Bay. These species include: beluga whale (*Delphinapterus leucas*); bowhead whale (*Balaena mysticetus*); gray whale (*Eschrichtius robustus*); harbor porpoise (*Phocoena phocoena*); bearded seal (*Erignathus barbatus*); ringed seal (*Phoca hispida*); spotted seal (*P. largha*); and ribbon seal (*Histriophoca fasciata*).

Description of the Specified Activity and Specified Geographic Region

Shell plans to conduct an offshore exploration drilling program on U.S. Department of the Interior (DOI), Bureau of Ocean Energy Management (BOEM, formerly the Minerals Management Service) Alaska OCS leases located north of Point Thomson near Camden Bay in the Beaufort Sea, Alaska, during the 2012 open-water season. During the 2012 drilling program (July through October), Shell plans to complete two exploration wells at two drill sites, one well each on the Torpedo prospect (NR06–04 Flaxman Island lease block 6610, OCS–Y–1941 [Flaxman Island 6610—Torpedo ''H'' or ''J'' drill site]) and the Sivulliq prospect (NR06–04 Flaxman Island lease block 6658, OCS–

Y 1805 [Flaxman Island 6658—Sivulliq ''N'' or ''G'' drill sites]). See Figure 1–1 in Shell's application for the lease block and drill site locations (see **ADDRESSES**). All drilling is planned to be vertical.

The Notice of Proposed IHA (76 FR 68974, November 7, 2011) contained a full description of Shell's planned operations. That notice describes the equipment to be used for the different operational activities, the timeframe of activities, and the sound characteristics of the associated equipment. Except to clarify changes to the information contained in the proposed IHA notice, the information is not repeated here; therefore, please refer to the proposed IHA for the full description of the specified activity and specified geographic region.

Drilling Vessels

The Notice of Proposed IHA (76 FR 68974, November 7, 2011) noted that Shell plans to use one of two drilling vessels for its 2012 Camden Bay exploratory drilling program: the *Kulluk* (owned by Shell and operated by Noble Drilling [Noble]); or the *Discoverer* (owned and operated by Noble). Only one of these drilling vessels would be used for the Camden Bay program, not both. Information on each vessel can be found in Attachment A of Shell's IHA application (see **ADDRESSES**). Since publication of that notice, Shell has continued to refine the details of its program. Shell intends for the *Kulluk* to be the primary choice of drillship to be used for the Camden Bay program. The *Discoverer* is Shell's second choice for use as the drillship and will only be used for the 2012 Camden Bay program if the primary drillship (*i.e.,* the *Kulluk*) is unavailable.

Exploratory Drilling Program Sound Characteristics

Potential impacts to marine mammals could occur from the noise produced by the drillship and its support vessels (including the icebreakers), aircraft, and the airgun array during ZVSP surveys. The drillship produces continuous noise into the marine environment. NMFS currently uses a threshold of 120 dB re 1 μPa (rms) for the onset of Level B harassment from continuous sound sources. This 120 dB threshold is also applicable for the icebreakers when actively managing or breaking ice. The airgun array to be used by Shell for the ZVSP surveys produces pulsed noise into the marine environment. NMFS currently uses a threshold of 160 dB re 1 μPa (rms) for the onset of Level B harassment from pulsed sound sources.

The Notice of Proposed IHA (76 FR 68974, November 7, 2011) contains information regarding sound characteristics of the *Kulluk* and *Discoverer,* other vessels, aircraft, and airguns. That information is not repeated here. However, Shell conducted a retrofit of the *Kulluk* following publication of the Notice of Proposed IHA. The purpose of the retrofit is to reduce transmission of noise from the vessel into the water. A brief description of the retrofit is provided here.

Two primary noise-reducing technologies have been installed on the *Kulluk* in its main engine room that houses the new engine-driven generators (gensets). These technologies are surface acoustic insulation and resilient engine mounts upon which the new gensets were recently installed. Both technologies reduce the amount of mechanical vibrations transmitted from the water. The surface insulation is expected to reduce transmission of airborne sound energy into the deck and bulkheads and subsequently through the vessel hull into the water. The resilient engine mounts provide vibrational isolation of the genset engines from the deck to reduce mechanical vibrations that would otherwise be conducted into the deck and subsequently through the vessel structure and hull into the water as sound. The use of modern generators is itself expected to result in some vibration reduction.

Because measurements of the drilling vessel's acoustic source levels have not yet been made with quieting technologies installed, the actual sound emission reductions cannot yet be quantified with certainty. Once on location in Camden Bay, Shell plans to take measurements of the drillship to quantify the absolute sound levels produced by drilling and to monitor their variations with time, distance, and direction from the drilling vessel. However, Shell estimated the reductions based on applications of similar technologies applied elsewhere. A comprehensive review of noise reducing technologies provides ranges of achieved reductions by several different technologies (Spence *et al.,* 2007; see Table 1 here). One should not assume that the reductions are additive because one transmission pathway could dominate, and improvement of the other pathway would have little benefit. NMFS acoustic experts reviewed the information provided by Shell regarding the quieting technologies and additional sources and determined that a 5 dB reduction of modeled noise source is a reasonable estimate of the effectiveness of the quieting techniques being implemented. Therefore, for purposes of calculating potential takes by harassment from the *Kulluk,* NMFS has assumed a 5 dB reduction, which alters the 120-dB isopleth by a factor of 1.6. Additional information on sound radii and take estimates are provided later in this document.

Table 1. Reductions of emitted sound levels by noise quieting technologies (Spence et al., 2007).

Treatment	Description	Effectiveness Reduction	Frequency range
Resilient Isolation of Equipment	Reduction of vibration by mechanically isolating machinery from supporting structure	0-20+ dB 10-25+ dB	20-100 Hz >100 Hz
Spray-on Damping	Reduces vibration energy in structures. Used on stiffened plating near machinery sources, plating adjacent to water, and locations in-between.	3-8+ dB depending on type, amount and location	>30 Hz

Comments and Responses

A Notice of Proposed IHA published in the **Federal Register** on November 7, 2011 (76 FR 68974) for public comment. During the 30-day public comment period, NMFS received nine comment letters from the following: the Alaska Eskimo Whaling Commission (AEWC); Inupiat Community of the Arctic Slope (ICAS); the Marine Mammal Commission (MMC); State of Alaska Department of Natural Resources; Consumer Energy Alliance; Resource Development Council; the North Slope Borough (NSB); Shell; and Alaska Wilderness League (AWL), Audubon Alaska, Center for Biological Diversity, Defenders of Wildlife, Earthjustice, Natural Resources Defense Council, Northern Alaska Environmental Center, Oceana, Pacific Environment, Resisting Environmental Destruction on Indigenous Lands, Sierra Club, the Wilderness Society, and World Wildlife Fund (collectively ''AWL''), along with an attached letter from David E. Bain, Ph.D.

AWL submitted several journal articles and documents as attachments to their comment letter. NMFS acknowledges receipt of these articles and documents but does not intend to address each one specifically in the responses to comments. All of the public comment letters received on the Notice of Proposed IHA (76 FR 68974, November 7, 2011) are available on the internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Following is a summary of the public comments and NMFS' responses.

General Comments

Comment 1: Shell notes that NMFS stated in the Notice of Proposed IHA (76 FR 68975, November 7, 2011) that either drillship will be ''attended by 11 vessels.'' Shell states that the actual number of support vessels may vary due to operational needs and therefore did not note 11 as an absolute number in the IHA application.

Response: NMFS acknowledges this comment and understands that there might be slight variation in the number of vessels. However, this does not change the analysis provided in the Notice of Proposed IHA (76 FR 68975, November 7, 2011).

Comment 2: The State of Alaska Department of Natural Resources, Consumer Energy Alliance, and Resource Development Council all urge NMFS to finalize Shell's IHA since NMFS has issued the proposed IHA.

Response: After careful evaluation of all comments and the data and information available regarding potential impacts to marine mammals and their habitat and to the availability of marine mammals for subsistence uses, NMFS has issued the final authorization to Shell to take marine mammals incidental to conducting an exploration drilling program in Camden Bay during the 2012 Arctic open-water season.

Comment 3: ICAS incorporates the comments made by the AEWC into its letter by reference and urges NMFS to address the concerns of AEWC and its whaling captains.

Response: All comments made by the AEWC are addressed in this document.

Comment 4: The MMC and AWL question the source levels and harassment zones for the two drillships. If the source levels for the *Kulluk* and *Discoverer* are nearly identical, then why is there a four-fold difference in the size of the corrected harassment zones for the two drilling vessels?

Response: Differences in sound propagation from the two rigs are real and are caused by differences in the design of the two vessels. While the broadband source levels for the *Discoverer* and *Kulluk* may be similar, their spectral properties differ considerably. Acoustic modeling considers the source levels in 1/3-octave frequency bands. Figures 1 and 2 show the band levels for both drillships during drilling. Of key importance are the significantly lower levels of the *Discoverer* in the 50 to 500 Hz bands that propagate well in the relatively shallow waters of these drilling operations. While the *Discoverer* apparently has higher band levels below 50 Hz, this energy is more rapidly attenuated than higher frequency sound energy. This characteristic of sound propagation in shallow waters leads to predominantly mid-frequency sounds (50–500 Hz) dominating the acoustic field at distance from the drillships. A further consideration is that the *Kulluk* source levels are known to include contributions from support vessels, and much of the mid-high frequency band energy in its source levels may not originate entirely from the drillship itself, as acknowledged by Greene (1987). The *Discoverer* source level measurements by Austin and Warner (2010) were made at closer distances and do not include significant contributions from other vessels. The *Kulluk's* modeled sound footprint may be an overestimate as a result, but we cannot quantify by how much since the relative contribution of vessel noise to its source level measurements is unknown. The source level for the *Discoverer* was measured, though not in the Beaufort Sea, and those measurements were used to model propagation in the Beaufort Sea environment. Regardless of which drill rig is used by Shell in the Beaufort Sea in 2012, the IHA requires Shell to conduct sound source verification (SSV) and characterization tests on all equipment used.

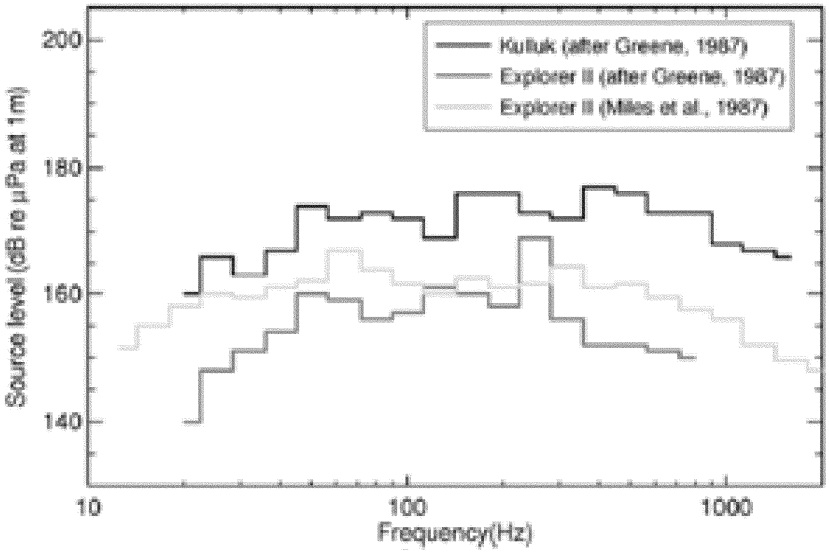

Figure 1. Band levels for the Kulluk during drilling.

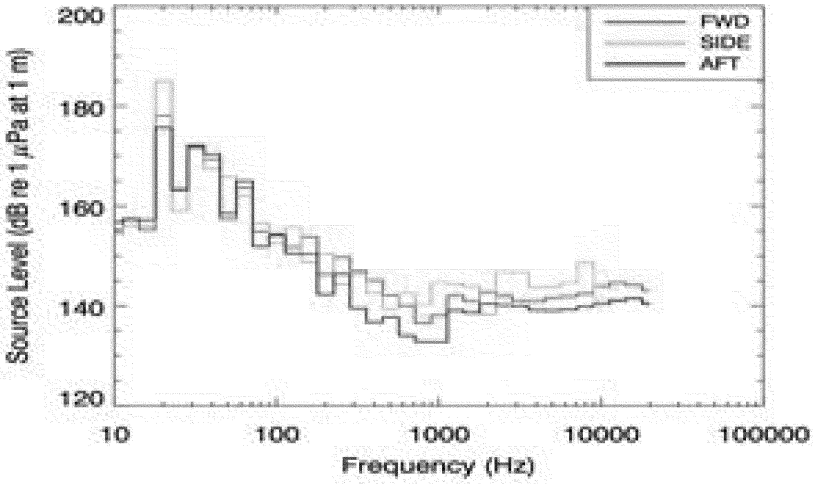

Figure 2. Band levels for the Discoverer during drilling.

Comment 5: The NSB stated in their letter that comments made previously on Shell's IHA applications for seismic and drilling are still applicable and are incorporated by reference into their letter dated December 7, 2011.

Response: NMFS has responded to comments on Shell's seismic IHA requests in previous **Federal Register** notices. Those responses are incorporated into this document by reference (*e.g.,* 73 FR 66106, November 6, 2008; 74 FR 55368, October 27, 2009; 75 FR 49710, August 13, 2010). The NSB submitted letters regarding Shell's proposed Camden Bay exploration drilling programs for the years 2007, 2008, and 2010. NMFS has only provided responses to comments contained in the 2007, 2008, and 2010 letters that are different from comments in the NSB's 2011 letter on this IHA. Additionally, some of the comments in those three earlier letters are no longer relevant to Shell's program as currently proposed in this document.

MMPA Statutory Concerns

Comment 6: The AEWC, NSB, AWL, and MMC state that the requested take does not meet the MMPA standard of ''small numbers'' and that the proposed IHA does not demonstrate that Shell's activities will have only a negligible impact on the species or stock. The NSB states that NMFS fails to distinguish between these two standards. AWL states that the proposed IHA does not include a specific ''small numbers'' finding for bowhead whales. Additionally, AEWC, MMC, and AWL ask NMFS to clarify how the statutory standard of ''least practicable impact'' is being met if the *Kulluk* is permitted for use instead of the *Discoverer,* which will have a smaller zone of impact.

Response: First, NMFS is not required to publish a preliminary finding regarding ''small numbers'' at the proposed IHA stage. The MMPA implementing regulations indicate that NMFS will publish any preliminary finding of ''negligible impact'' or ''no unmitigable adverse impact'' for public comment along with the proposed IHA if preliminary findings have been made at that time. 50 CFR 216.104(c). In this instance, at the proposed IHA stage

NMFS was still evaluating the available information and believed it would be beneficial to review information and comments submitted by the public before making determinations regarding whether Shell's proposed action will have a negligible impact on the affected species or stocks of marine mammals and no unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. There is no requirement to include a finding of ''small numbers'' as part of a proposed IHA. Based on our review, we have made the requisite findings of small numbers, negligible impact, and no unmitigable adverse impact on the availability of the taking of marine mammals for subsistence uses.

NMFS is required to authorize the take of ''small numbers'' of a species or stock if the taking by harassment will have a negligible impact on the affected species or stocks and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence purposes. *See* 16 U.S.C. 1371(a)(5)(D). In determining whether to authorize ''small numbers'' of a species or stock, NMFS determines whether the taking will be small relative to the estimated population size and relevant to the behavior, physiology, and life history of the species or stock.

With the exception of bowhead whales, less than 1% of each species stock or population would be taken by harassment, regardless of which drillship is utilized by Shell. With respect to the type of take, NMFS is authorizing only Level B behavioral harassment of bowhead whales and does not anticipate any injury or mortality. The Bering-Chukchi-Beaufort (BCB) stock of bowhead whales is estimated at approximately 15,232 individuals based on a 2001 population of 10,545 (Zeh and Punt, 2005) and a continued annual growth rate of 3.4% (Allen and Angliss, 2011). Although modeling results indicate that up to 23% of the BCB bowhead whale population (which is lower than the estimate provided in the Notice of Proposed IHA based on the retrofit of the *Kulluk*) could potentially be exposed to received sound levels ≥120 dB re 1 μPa, NMFS is confident that takes resulting from Shell's activities will constitute only a ''small number'' of bowheads for the following reasons:

(1) The modeling results do not mean that 23% of the BCB bowhead whale population will *actually* be ''taken'' by Level B behavioral harassment. Bowheads may engage in avoidance behavior preventing their exposure to these levels of sound, and, even if exposed, may not exhibit a behavioral reaction.

(2) In reviewing information submitted by Shell regarding the modeling of the number of bowheads potentially affected, NMFS considered the fact that Shell's estimates included an inflation factor of the sound radii, meaning that the *actual* number of animals exposed to sound levels ≥120 dB will almost certainly be lower than the projections described here; and

(3) With the exception of the subsistence mitigation measure of shutting down during the Nuiqsut and Kaktovik fall bowhead whale hunts, the modeling results do not take into account the implementation of mitigation measures, which will lower the number of animals taken even further.

Finally, the MMPA requires that NMFS prescribe mitigation measures to ensure the least practicable impact on marine mammal species or stocks. NMFS' evaluation of mitigation measures includes consideration of the following factors in relation to one another: (1) The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

In this instance, NMFS is authorizing only Level B behavioral harassment and has concluded the take from the specified activity will have a negligible impact on marine mammals, regardless of whether the *Kulluk* or the *Discoverer* is used. Even if the determination of which drill rig to use could properly be characterized as a ''mitigation measure,'' Shell has submitted information indicating that a requirement to use the *Discoverer* in the Beaufort during its 2012 drilling program would not constitute a practicable mitigation measure.

Determining which drill rig to use is based upon a complex combination of technical factors. One of the most important factors is that of being the optimum vessel to operate under the specific conditions that exist at the specific location. Shell indicates that the company specifically acquired the *Kulluk* for nearshore operations in the Beaufort Sea, and since that time has invested hundreds of millions of dollars in upgrading and maintaining the vessel. The vessel has a proven track record, as it has been used successfully for such work in both the Alaskan and Canadian Beaufort Sea nearshore waters, including, most recently, five wells in or in the immediate vicinity of Camden Bay. Because the *Kulluk* is the rig most capable of operating under ice conditions, it is the most appropriate rig to operate in the Beaufort Sea where ice conditions may be subject to quick change. Though Shell does not intend to operate under conditions of ice closure, use of the *Kulluk* in the Beaufort Sea provides the greatest margin of safety. It is not practicable for Shell to forfeit an investment of hundreds of millions of dollars in order to provide only marginal reductions to impacts that NMFS has already determined will be negligible.

Comment 7: The AEWC and AWL state that NMFS cannot make a negligible impact determination without considering other activities planned for this year and future years in the U.S. Arctic Ocean and Russian and Canadian waters. AWL states that NMFS should also evaluate the potential impacts of future activities in both oceans and the acknowledged uncertainty regarding the effects of noise in the marine environment in the context of subsistence hunting.

Response: NMFS considered the cumulative effects analysis contained in NMFS' Draft Environmental Impact Statement (EIS) on the ''Effects of Oil and Gas Activities in the Arctic Ocean'' (NMFS, 2011), NMFS' EA for the ''Issuance of Incidental Harassment Authorizations for the Take of Marine Mammals by Harassment Incidental to Conducting Exploratory Drilling Programs in the U.S. Beaufort and Chukchi Seas,'' and other relevant data to inform its MMPA determination here. Pursuant to NEPA, those documents contained a cumulative impacts assessment, as well as an assessment of the impacts of the proposed exploratory drilling program on marine mammals and other protected resources.

Section 101(a)(5)(D) of the MMPA and its implementing regulations require NMFS to consider a request for the taking of marine mammals incidental to a *specified activity* within a specified geographical region and, assuming certain findings can be made, to authorize the taking of small numbers of marine mammals while engaged in that activity. NMFS has defined ''specified activity'' in 50 CFR 216.103 as ''any activity, other than commercial fishing, that takes place in a specified geographical region and potentially involves the taking of small numbers of marine mammals.'' When making a negligible impact determination, NMFS considers the total impact during each 1-year period resulting from the specified activity only and supports its determination by relying on factors such

as: (1) The number of anticipated mortalities from the activity; (2) the number and nature of anticipated injuries from the activity; (3) the number, nature, intensity, and duration of Level B harassment resulting from the activity; (4) the context in which the takes occur; (5) the status of the species or stock; (6) environmental features that may significantly increase the potential severity of impacts from the proposed action; (7) effects on habitat that could affect rates of recruitment or survival; and (8) how the mitigation measures are expected to reduce the number or severity of takes or the impacts to habitat. When making its finding that there will be no unmitigable adverse impact on the availability of the affected species or stock for taking for subsistence uses, NMFS analyzes the measures contained in the applicant's Plan of Cooperation (POC). Additionally, Shell signed the 2012 Conflict Avoidance Agreement (CAA) with the AEWC. NMFS included all necessary measures from both documents in the IHA to ensure no unmitigable adverse impacts to subsistence.

NMFS considered the impacts analyses (*i.e.,* direct, indirect, and cumulative) contained in the previously mentioned EIS and EA in reaching its conclusion that any marine mammals exposed to the sounds produced by the drillship, ice management/icebreaking vessels, support vessels and aircraft, and airguns would be disturbed for only a short period of time and would not be harmed or killed. Furthermore, the required mitigation and monitoring measures are expected to reduce the likelihood or severity of any impacts to marine mammals or their habitats over the course of the activities.

Moreover, NMFS gave careful consideration to a number of other issues and sources of information. In particular, NMFS relied upon a number of scientific reports, including the 2010 U.S. Alaska Marine Mammal Stock Assessment Reports (SARs) to support its findings. The SARs contain a description of each marine mammal stock, its geographic range, a minimum population estimate, current population trends, current and maximum net productivity rates, optimum sustainable population levels and allowable removal levels, and estimates of annual human-caused mortality and serious injury through interactions with commercial fisheries and subsistence harvest data. NMFS also used data from the annual and final Bowhead Whale Aerial Survey Program (BWASP) reports.

After careful consideration of the proposed activities, the context in which Shell's proposed activities would occur, the best available scientific information, and all effects analyses (including cumulative effects), NMFS has determined that the specified activities: (1) Would not result in more than the behavioral harassment (*i.e.,* Level B harassment) of small numbers of marine mammal species or stocks; (2) taking by harassment would not result in more than a negligible impact on affected species or stocks; and (3) taking by harassment would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. Therefore NMFS has decided to issue an IHA to Shell to take, by no more than Level B harassment, small numbers of marine mammals incidental to its Camden Bay exploratory drilling program.

Comment 8: The MMC recommends that NMFS require Shell to evaluate the source levels of the available drilling rigs at the proposed drilling locations, recalculate the 120-dB re 1 μPa harassment zones and estimated takes as appropriate, and use the rig best suited for the proposed drilling locations based, in part, on consideration of the size of the harassment zones and the requirements of the MMPA to reduce impacts of the proposed activity to the least practicable level.

Response: As conditioned in the IHA, Shell is required to conduct SSV and characterization of the equipment to be used, including the drilling rig. Shell is required to report received levels down to 120 dB re 1 μPa. Upon completion of those tests, Shell will then use the new sound radii for estimating take throughout the season. While new take estimates will not be calculated to replace those in the application, Shell will use the new radii for reporting estimated take levels in the 90-day report. See the response to *Comment 6* regarding use of the different drilling rigs in Camden Bay.

Comment 9: The NSB and AWL state that NMFS must consider whether the increase in vessel presence and vessel noise around the drill sites and during transit across the Arctic have the potential to disturb marine mammals.

Response: Shell's application and NMFS' Notice of Proposed IHA (76 FR 68974, November 7, 2011) outline all of the vessels intended for use to support the exploratory drilling program. While the application and proposed IHA do not include source levels or take estimates for those vessels, their presence is considered and accounted for in several of the mitigation measures. For example, vessel speed and maneuvering conditions apply to all vessels, not just the drill ship and icebreakers. Therefore, while NMFS contemplated the use of all vessels during activities and has included mitigation measures during operation of these vessels to reduce potentially disturbing marine mammals in the vicinity, NMFS does not consider the transit or operation of these vessels to rise to a level that would result in take.

Comment 10: The NSB states that there is a general lack of information regarding behavior of animals that have previously been exposed to industrial sounds and that no studies have looked at long-term impacts on survival or reproduction. With limited information available, NMFS cannot make a rational negligible impact finding. The NSB (in its 2008 letter) and AWL state that a lack of adequate information precludes NMFS from complying with the MMPA standards. AWL states that NMFS should defer all oil and gas-related IHAs while the necessary information is gathered.

Response: As required by the MMPA implementing regulations at 50 CFR 216.102(a), NMFS has used the best scientific information available in assessing potential impacts and whether the activity will have no more than a negligible impact on the affected marine mammal species or stock (please see response to *Comment 7*). However, while NMFS agrees that there may be some uncertainty regarding behavior of animals that have been previously exposed to industrial sounds and how that may impact survival and reproduction, the best available information supports our findings.

Industrial activities have been occurring (at varying rates) in the U.S. Arctic Ocean for decades, and the available measurable indicators do not suggest that these activities are having long-term impacts. For example, bowhead whales continued to increase in abundance during periods of intense seismic activity in the Chukchi Sea in the 1980s (Raftery *et al.,* 1995; Angliss and Outlaw, 2007), even without implementation of current mitigation requirements. Additionally, industry has been collecting data and conducting monitoring in the region for many years and will continue to do so under this IHA. Therefore, NMFS has determined that a negligible impact finding is rational.

Comment 11: AWL and the NSB (in its 2008 letter) note that Shell's activities have the potential to result in serious injury. AWL also states that in the proposed IHA, NMFS conflated two different regulatory provisions governing the issuance of IHAs when it

stated that for there to be the potential for serious injury or mortality an activity must be ''reasonably expected or likely'' to result in serious injury or mortality. AWL's letter states: ''There is no indication that NMFS considered the dire consequences of a spill when determining whether the 'potential' for serious harm exists * * * NMFS must carefully consider these risks and apply the appropriate MMPA standard.''

Response: As analyzed in the proposed IHA, NMFS has determined that Shell's activities are not likely to result in injury, serious injury, or mortality. The activities for which Shell is authorized to take marine mammals would most likely result in behavioral harassment. The mitigation and monitoring measures analyzed in the proposed IHA and required in the authorization are designed to ensure the least practicable impact on marine mammals and their habitat and the availability of marine mammals for subsistence uses.

AWL cites to NMFS' definition of ''negligible impact'' to argue that the agency has improperly conflated separate regulatory standards. ''Negligible impact is 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'' (50 CFR 216.103).

NMFS believes its decision-making should be informed by whether impacts are actually reasonably likely to occur. This principle is recognized in multiple contexts, and this does not represent the conflation of separate regulatory standards (in this instance, ''negligible impact'' and ''potential to result in serious injury or mortality''). It is well recognized in the cases interpreting NEPA. For example see *Ground Zero Ctr. for Non-Violent Action* v. *United States Dept of the Navy,* 383 F.3d 1082, 1090–91 (9th Cir. 2004) (concluding that where Navy had concluded that risk was extremely remote, ''such remote possibilities do not in law require environmental evaluation.'') As explained later in this document, this interpretation reflects NMFS' longstanding practice of issuing IHAs in cases where the agency found that the potential for serious injury or mortality was ''highly unlikely'' (See 73 FR 40512, 40514, July 15, 2008; 73 FR 45969, 45971, August 7, 2008; 73 FR 46774, 46778, August 11, 2008; 73 FR 66106, 66109, November 6, 2008; 74 FR 55368, 55371, October 27, 2009). Interpreting ''potential'' to include impacts with any probability of occurring (*i.e.,* speculative or extremely low probability events) would be administratively unworkable and inconsistent with Congressional intent. NMFS' proposed IHA considered the risks of an oil spill in its analysis and used that analysis to make the final determinations here.

Comment 12: AWL states that if Shell is unable to commence drilling in the Chukchi Sea in 2012 and therefore can use the *Discoverer* in the Beaufort Sea, for purposes of this MMPA review, NMFS should assume that the *Kulluk* is used in the Beaufort Sea in order to capture the full extent of the potential effects.

Response: In conducting this MMPA review, NMFS assumed that either vessel could be used and presented a range of estimated takes and potential impacts. Additionally, in the EA, NMFS assumed use of the *Discoverer* in the Chukchi Sea and the *Kulluk* in the Beaufort Sea in order to assess the combined higher level of potential takes.

Marine Mammal Impact Concerns

Comment 13: AWL states that NMFS' uniform marine mammal harassment thresholds do not consider documented reactions of specific species in the Arctic to much lower received levels. The letter notes reactions of bowhead and beluga whales to certain activities below 160 dB. The letter also states: ''At a minimum, the proposed IHA cannot apply thresholds that fail to accurately capture potential marine mammal harassment, as required by the standards imposed by the MMPA.''

Response: For continuous sounds, such as those produced by drilling operations and during icebreaking activities, NMFS uses a received level of 120-dB (rms) to indicate the onset of Level B harassment. For impulsive sounds, such as those produced by the airgun array during the ZVSP surveys, NMFS uses a received level of 160-dB (rms) to indicate the onset of Level B harassment. Therefore, while a level of 160-dB was used to estimate take for a portion of the operations that will only occur for a total of 10–28 hours during the entire 4-month open-water season, a threshold of 120-dB was used to estimate potential takes for all species from the drilling operations and ice management/icebreaking activities.

While some published articles indicate that certain marine mammal species may avoid seismic airguns (an impulsive sound source) at levels below 160 dB, NMFS does not consider that these responses rise to the level of a take, as defined in the MMPA. While studies, such as Miller *et al.* (1999), have indicated that some bowhead whales may have started to deflect from their migratory path 21.7 mi (35 km) from the seismic source vessel, it should be pointed out that these minor course changes are during migration and have not been seen at other times of the year and during other activities. To show the contextual nature of this minor behavioral modification, recent monitoring studies of Canadian seismic operations indicate that feeding, non-migratory bowhead whales do not move away from a noise source at a sound pressure level (SPL) of 160 dB. Therefore, while bowheads may avoid an area of 12.4 mi (20 km) 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 does not consider that deviation to rise to a level of a ''take,'' as the change in bearing is due to animals sensing the noise and avoiding passage through the ensonified area during their migration and should not be considered as being displaced from their habitat. 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 μPa).

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 a reaction would be considered a take. According to experts on marine mammal behavior, whether a particular stressor could potentially disrupt the migration, breathing, nursing, breeding, feeding, or sheltering, etc., of a marine mammal, *i.e.,* whether it would result in a take, is complex and context specific, and it depends on several variables in addition to the received level of the sound by the animals. These additional variables include: Other source characteristics (such as frequency range, duty cycle, continuous vs. impulse vs. intermittent sounds, duration, moving vs. stationary sources, etc.); specific species, populations, and/or stocks; prior experience of the animals (naive vs. previously exposed); habituation or sensitization of the sound by the animals; and behavior context (whether the animal perceives the sound as predatory or simply annoyance), etc. (Southall *et al.* 2007). Therefore, although using a uniform SPL of 160–dB for the onset of behavioral harassment for impulse noises may not capture all of the nuances of different marine mammal reactions to sound, it is an appropriate metric to guide our evaluation of anthropogenic noise

impacts on marine mammals. Therefore, 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). However, as mentioned earlier, NMFS used the lower threshold of 120-dB to estimate potential Level B harassment takes of marine mammals from the continuous sounds of the drillship and ice management/icebreaking vessels.

Comment 14: AWL and Dr. Bain indicate that a large-scale disruption to bowhead whales feeding near Camden Bay would exceed the negligible impact standard of the MMPA. Additionally, an assumption that displacement to another part of the range is harmless does not have sound basis. Dr. Bain also states that excluding whales from feeding areas effectively reduces the carrying capacity, which in turn reduces the rate of population increase and is equivalent to removing individuals from the population.

Response: Recent articles and reports have noted bowhead whales feeding in several areas of the U.S. Beaufort Sea. The Barrow area is commonly used as a feeding area during spring and fall, with a higher proportion of photographed individuals displaying evidence of feeding in fall rather than spring (Mocklin, 2009). A bowhead whale feeding ''hotspot'' (Okkonen *et al.,* 2011) commonly forms on the western Beaufort Sea shelf off Point Barrow in late summer and fall. Favorable conditions concentrate euphausiids and copepods, and bowhead whales congregate to exploit the dense prey (Ashjian *et al.,* 2010, Moore *et al.,* 2010; Okkonen *et al.,* 2011). Surveys have also noted bowhead whales feeding in the Camden Bay area during the fall (Koski and Miller, 2009; Quakenbush *et al.,* 2010). As noted by AWL's and Dr. Bain's letters, displacement from feeding grounds with high prey density to ones with low prey density would reduce food intake. However, there is nothing to indicate the prey densities are lower off Point Barrow than in Camden Bay.

The 2006–2008 BWASP Final Report (Clarke *et al.,* 2011a) and the 2009 BWASP Final Report (Clarke *et al.,* 2011b) note sightings of feeding bowhead whales in the Beaufort Sea during the fall season. During that 4 year period, the largest groups of feeding whales were sighted between Smith Bay and Point Barrow (hundreds of miles to the west of Camden Bay), and none were sighted feeding in Camden Bay (Clarke *et al.,* 2011a, b). In 2007, a small group of whales were seen feeding off of Kaktovik, which is just to the east of Camden Bay (Clarke *et al.,* 2011a). Clarke and Ferguson (undated) examined the raw BWASP data from the years 2000–2009. They noted that feeding behavior was noted more often in September than October and that while bowheads were observed feeding throughout the study area (which includes the entire U.S. Beaufort Sea), sightings were less frequent in the central Alaskan Beaufort than they were east of Kaktovik and west of Smith Bay. Additionally, Clarke and Ferguson (undated) and Clarke *et al.* (2011b) refer to information from Ashjian *et al.* (2010), which describes the importance of wind-driven currents that produce favorable feeding conditions for bowhead whales in the area between Smith Bay and Point Barrow. Increased winds in that area may be increasing the incidence of upwelling, which in turn may be the reason for increased sightings of feeding bowheads in the area. Clarke and Ferguson (undated) also note that the incidence of feeding bowheads in the eastern Alaskan Beaufort Sea has decreased since the early 1980s. Therefore, NMFS' statement about sufficient feeding grounds being available outside of Camden Bay is based on recent data.

Moreover, while some whales may avoid Camden Bay because of the increased sound levels while operations are ongoing, there has also been evidence that some bowheads continued feeding in close proximity to seismic sources (*e.g.,* Richardson, 2004). The sounds produced by the drillship are of lower intensity than those produced by seismic airguns. Therefore, if animals remain in ensonified areas to feed, their feeding opportunity would not be missed, and they would be in areas where the sound levels are not high enough to cause injury (as discussed in greater detail later in this document).

Lastly, Shell will cease operations in Camden Bay on August 25 and will not resume until the close of the fall bowhead whale hunts conducted by the communities of Kaktovik and Nuiqsut. Those hunts typically end in mid-September but could remain open until as late as the end of September. Therefore, early migrating whales will be afforded the opportunity to feed in Camden Bay without any operations going on in the vicinity. Based on this information and the proposed shutdown, NMFS does not anticipate that whales will be excluded from feeding opportunities in Camden Bay in numbers sufficient to reduce carrying capacity or the rate of population increase.

Comment 15: AWL states that the proposed IHA fails to adequately address impacts to bowhead whale cow/calf pairs during the spring and fall migrations.

Response: NMFS discussed potential impacts to bowhead whales, including cow/calf pairs in the Notice of Proposed IHA (76 FR 68974, November 7, 2011). In the section that discussed potential impacts to marine mammals from the specified activity, NMFS described data from studies that included observations and reactions (or lack thereof) of cow/calf pairs to different anthropogenic activities. Additionally, NMFS included discussion of cow/calf pairs in the negligible impact analysis section of that document. Mitigation measures are required in the IHA during vessel transits (*e.g.,* speed restrictions, avoiding multiple changes in direction when within 300 yards [274 m] of whales) through the Chukchi and Beaufort Seas as the vessels mobilize to Camden Bay. These measures will ensure that potential impacts are reduced to the lowest level practicable. Moreover, Shell will not enter the Chukchi Sea prior to July 1, after the conclusion of the spring bowhead whale migration.

Comment 16: AWL states that NMFS must consider whether Shell's ice management efforts have the potential to seriously injure or kill ringed seals resting on pack ice.

Response: NMFS considered the potential impacts of Shell's ice management efforts to ringed seals resting on pack ice in the Notice of Proposed IHA (76 FR 68974, November 7, 2011) in the section regarding anticipated effects on marine mammal habitat. AWL also references the MMS 2008 Draft EIS for the Beaufort Sea and Chukchi Sea Planning Areas Oil and Gas Lease Sales 209, 212, 217, and 221 (MMS, 2008), which includes a reference to Reeves (1998). Reeves (1998) noted that some ringed seals have been killed by icebreakers moving through fast-ice breeding areas. In the proposed IHA analysis, NMFS considered this information and noted that since Shell's use of the icebreakers would occur outside of the ringed seal breeding and pupping seasons in the Beaufort Sea, serious injury or mortality from use of the icebreakers would not occur.

Limited ice breaking might be needed to assist the fleet in accessing/exiting the project area if large amounts of ice pose a navigational hazard. Ice seals have variable responses to ice management activity. Alliston (1980, 1981) reported icebreaking activities did not adversely affect ringed seal abundance in the Northwest Territories and Labrador. Brueggeman *et al.* (1992)

reported ringed seals and bearded seals diving into the water when an icebreaker was 0.58 mi (0.93 km) away. However, Kanik *et al.* (1980) reported that ringed seals remained on sea ice when an icebreaker was 0.62–1.24 mi (1–2 km) away.

The drill site is expected to be mostly ice-free during July, August, and September, and the need for ice management should be infrequent. The presence of an icebreaker is primarily a safety precaution to protect the drill ship from damage. Ice seals could be on isolated floes that may need to be managed for safety. Any ice seals on floes approaching the drill ship may be disturbed by ice management activities. Ringed seals on an ice floe are anticipated to enter the water before the icebreaker contacts the ice, remain in the water as the ice moves past the drill ship, and could reoccupy ice after it has moved safely past the drill ship. As was discussed in the proposed IHA, NMFS determined that this activity and these reactions would result in Level B harassment. NMFS did not determine that there was a potential for serious injury or morality to occur from Shell's ice management efforts.

Comment 17: AWL states that NMFS should consider and impose limits on the location and timing of the drilling to ensure that impacts are reduced.

Response: The IHA requires, and Shell will implement, a cessation of activity on August 25 through the completion of the fall bowhead whale hunts conducted by the communities of Kaktovik and Nuiqsut in order to ensure no unmitigable adverse impact on the availability of bowhead whales for subsistence uses. NMFS determined that this was the only time/area closure needed to make the requisite findings under Section 101(a)(5)(D) of the MMPA.

Comment 18: Dr. Bain states that noise exposure can lead to stress, which can impair the immune system and result in an increase in mortality from disease. He also notes that impairing the energy balance can slow growth, delay onset of sexual maturity, and increase the interval between successful births, all of which can cause a reduction in the number of animals recruited to the population. Dr. Bain concludes that these impacts in Camden Bay, which serves as a resting and feeding area for bowhead whales, will create the need for greater energy expenditure, leading to the impacts noted here.

Response: While deflection may cause animals to expend extra energy, there is no evidence that deflecting around oil and gas activities (or other anthropogenic activities) is causing a significant behavioral change that will adversely impact population growth. In fact, bowhead whales continued to increase in abundance during periods of intense seismic activity in the Chukchi Sea in the 1980s (Raftery *et al.,* 1995; Allen and Angliss, 2011). Additionally, as mentioned in the response to *Comment 14,* observations of feeding bowheads during aerial surveys from 2000–2009 have been made more often in the areas east of Kaktovik and from Smith Bay to Point Barrow than in Camden Bay (Clarke and Ferguson, undated; Clarke *et al.,* 2011a,b). Therefore, deflection around the drilling area is not anticipated to result in significantly reduced feeding opportunities of bowhead whales. Regarding recruitment of calves to the population, the count of 121 calves during the 2001 census was the highest yet recorded and was likely caused by a combination of variable recruitment and the large population size (George *et al.,* 2004). The calf count provides corroborating evidence for a healthy and increasing population. Based on this information, NMFS does not expect Shell's activities to impact annual rates of recruitment or survival within the Western Arctic bowhead stock.

Comment 19: Dr. Bain states: ''Disturbance has the effect of causing the population to behave as though it is closer to carrying capacity than it would in the absence of disturbance.'' Even though the bowhead population increased in the face of industry activity in the 1990s, an increase in disturbance now (while it appears close to carrying capacity) could result in slowed growth or a loss of individuals.

Response: Based on information provided in the responses to earlier comments in this section, NMFS does not agree that population growth would be slowed as a result of Shell's proposed activity or increase the numbers of individuals lost. There are no data indicating that the population cannot continue to grow (as it has for over a decade) in the face of such activities. Shell's activities will occur in a small portion of the bowhead's range. Additionally, activities will cease for the first few weeks of the fall migration, allowing for some individuals to pass without any potential for disturbance.

Comment 20: Dr. Bain states that the increase in vessel traffic associated with Shell's project increases the risk of ship strike.

Response: NMFS acknowledges that there is always some risk of a ship strike whenever a vessel transits the ocean. However, the IHA requires Shell to implement several mitigation measures applicable to vessel operation (*e.g.,* speed restrictions in the presence of marine mammals or in inclement weather, avoiding multiple changes in direction when within 300 yards [274 m] of whales) to reduce further the low probability of a ship strike.

Comment 21: Dr. Bain notes that masking of beluga whale echolocation signals by noise and temporary and permanent threshold shifts will impair the ability of belugas to find food. This mechanism is in addition to impaired abilities to find food due to displacement from high quality feeding areas.

Response: As noted in the proposed IHA, beluga whale echolocation signals have peak frequencies from 40–120 kHz, which are far above the frequency range of the sounds produced by the devices to be used by Shell during the Camden Bay exploratory drilling program. Therefore, those industrial sounds are not expected to interfere with echolocation. Additionally, the source levels of the drillships are lower than the thresholds used by NMFS for the onset of auditory injury. Shutdown and power-down measures are required in the IHA when the airguns are in use to help reduce further the extremely low likelihood of temporary threshold shift (a Level B harassment). Lastly, there are no data indicating that Camden Bay is an important feeding area for beluga whales.

Comment 22: Dr. Bain states: ''Support vessel traffic will be disturbing to the part of the beluga population using lagoons and other nearshore habitats.''

Response: For Shell's Camden Bay exploratory drilling program, transfer of supplies will occur either from the Deadhorse/West Dock shorebase or Dutch Harbor. For much of the early part of the operational season, belugas will not be present in high numbers in the Beaufort Sea. Transits through the Chukchi Sea to help support the Camden Bay, Beaufort Sea, program will occur further offshore, and support vessels will not enter the lagoons used by belugas in the Chukchi Sea. Moreover, as mentioned earlier in this document, Shell is required to implement several vessel mitigation measures to reduce impacts to marine mammals. NMFS analyzed the entirety of Shell's operations (including support vessel activities) and has included measures to reduce potential disturbance from all aspects of the operations.

Comment 23: Dr. Bain states that hearing loss or masking from exposure to high levels of noise would impair bowhead whales' ability to hear vocalizations. He also states that hearing

loss and masking would increase vulnerability to predation or ship strike, which in turn could increase mortality.

Response: As noted in the response to *Comment 21,* the source levels of the drillships are lower than the thresholds used by NMFS for the onset of auditory injury. Shutdown and power-down measures are required in the IHA when the airguns are in use to help reduce further the extremely low likelihood of temporary threshold shift (a Level B harassment). As noted in the proposed IHA, masking effects are anticipated to be limited. Annual acoustic monitoring near BP's Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (for examples, see Richardson *et al.,* 2007; Aerts and Richardson, 2008). To compensate for and reduce masking, some mysticetes may alter the frequencies of their communication sounds (Richardson *et al.,* 1995a; Parks *et al.,* 2007). Additionally, if some individuals avoid the drilling area, impacts from masking will be even lower. There is no evidence to suggest that any masking would increase the likelihood of death.

Acoustic Issues/Concerns

Comment 24: AWL and Dr. Bain question the radius of the 120 dB isopleth for the *Kulluk.* AWL states that the 120 dB distance is not conservative enough and therefore understates potential impacts to marine mammals. Dr. Bain indicates that the problems arise from differences in empirical data and that the modeling used does not capture the most efficient mode of propagation.

Response: The commenters cite to a study conducted by Hall *et al.* (1994) in noting that Shell did not use a conservative enough 120-dB radius for the *Kulluk.* Blackwell and Greene (unpub.) conducted an assessment of Hall *et al.* (1994) in comparison to Greene (1987). That assessment is summarized here. Blackwell and Greene (unpub.) found that there are two main issues with the information presented in the Hall *et al.* (1994) report. First, the authors did not characterize the sounds produced by the *Kulluk* during specific activities, such as drilling, but then assume that the sounds recorded tens or even more than 100 km away are indeed those of the *Kulluk.* In other words, they have no way of demonstrating that the sounds they recorded at tens of km from the *Kulluk* are actually made by the *Kulluk* or whether those sounds are made by other sources, such as vessels unrelated to the drilling project.

Second, the authors use propagation models that do not take into account scattering and absorption losses, which become important at distances of tens of km. The authors then use these models to make or support extrapolations to large distances, up to 120 km from the drilling operation. Also, as noted in the response to *Comment 4,* the source levels for the *Kulluk* used by the modeling study are considered an overestimate since they include the contributions of support vessels. Greene (1987), from which these measurements were taken, points out that measurements at 1 km from the drillship are a composite of the sounds emitted from the drillship and other vessels. Based on this information, NMFS has determined that an appropriate 120-dB radius was considered when assessing impacts to marine mammals.

Comment 25: AWL states that the proposed IHA is inadequate because it relies on modeling for the Sivulliq prospect to estimate the *Kulluk's* drilling noise despite the fact that sounds are ''expected to propagate shorter distances at the Sivulliq site.'' In contrast, NMFS took a ''precautionary approach'' when estimating the effects of drilling with the *Discoverer,* using the greater Torpedo site distance.

Response: Modeled predictions were performed for the drillship *Explorer* operating at both Sivulliq (site K) and Torpedo (site N) and for the *Kulluk* operating at Sivulliq only. It is true that the maximum propagation distance to the 120 dB re 1 μPa for the *Explorer* was greater at the Torpedo site, but the difference was less than 3% (the distances were 2.99 mi [4.81 km] and 3.06 mi [4.93 km] at Sivulliq and Torpedo, respectively). This is likely due to the fact that Torpedo is approximately 3.7 mi (6 km) further offshore, and sound from this location reaches into deeper water, even though the wellsite depths are almost identical (108.3 ft [33 m] at Torpedo vs. 111.5 ft [34 m] at Sivulliq). Remodeling of the *Kulluk* operation at Torpedo was deemed unnecessary due to the similarity of the predicted noise footprints at these two sites and because any variability would be conservatively accounted for by the use of the 1.5 correction factor. Additionally, as noted previously, Shell will conduct SSV measurements of all equipment once on location.

Comment 26: Dr. Bain states that the correction factor of 1.5 applied to the distance to the 120 dB contour is inadequate to conservatively account for the variability.

Response: The concern raised here is that the sound speed profile used for acoustic modeling of drill rig noise may not account for changes to the salinity and temperature profile that could influence and create variability in sound propagation, and the resulting variability might lead to conditions in which model estimates would not be conservative. While significant structure can form in the sound speed profile, the profile used for this modeling study was taken from the GDEM database for the corresponding locations and timing (month of September was used). The specific profile chosen (see Figure 3) has increasing sound speed with depth over the full water column. This profile leads to upward acoustic refraction that causes propagating sounds to bend up, thereby reducing interactions with the seabed. This situation generally reduces acoustic transmission loss as a result of acoustic energy being lost due to reflection and scattering from the bottom. It is believed to produce longer propagation distances than the stratified profile that sometimes forms with warmer high speed water overlying cooler water. That profile would be downward-refracting and would lead to more bottom interaction and sound energy loss. Therefore, a correction factor of 1.5 is appropriate in this circumstance.

Marine Mammal Biology Concerns

Comment 27: AWL states that information on the essential spatial and temporal habitat needs of beluga whales is limited, severely compromising the ability to assess the impacts of Shell's proposal.

Response: As noted in responses to earlier comments in this document, as required by the MMPA implementing regulations at 50 CFR 216.102(a), NMFS has used the best scientific information available in assessing potential impacts and whether the activity will have no more than a negligible impact on the affected marine mammal species or stock. However, while NMFS agrees that there may be some uncertainty regarding spatial and temporal habitat needs of belugas, the best available information supports our findings.

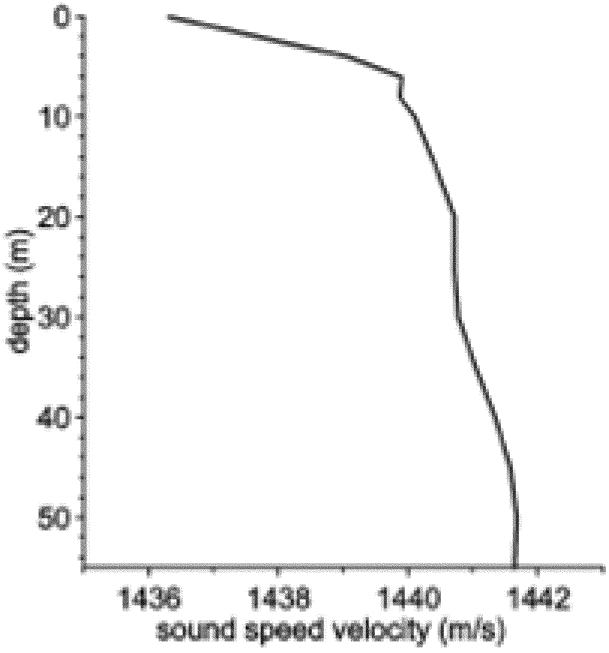

Figure 3. Sound speed profile used in drill rig modeling.

Comment 28: AWL states that any final IHA must analyze potential effects of all of Shell's operations on ribbon, ringed, spotted, and bearded seals and must do so considering the distinct habitats and life histories for each. AWL also notes that portions of the ringed and bearded seal populations are proposed for listing under the Endangered Species Act (ESA) and that those listings were prompted, in part, by the effects of climate change on ice seal habitat. The added stress of diminishing habitat should be considered in NMFS' analysis here.

Response: NMFS has considered the potential effects of Shell's activities on all four ice seal species in the context of the distinct habitats and life histories for each. In the proposed IHA, NMFS acknowledged the importance of sea ice to various life functions, such as breeding, pupping, and resting. Several of these species perform these functions on sea ice outside of the Camden Bay area. The ringed seal, which does construct subnivean lairs in the Beaufort, does not pup during the time when Shell would be operating. NMFS' EA for this action considers the impacts of climate change on ice seals in the region.

Comment 29: AWL notes the recent outbreak of skin lesions and sores among ringed seals. The letter states that NMFS should consider the weakened state of the population as part of the analysis. They also note that some spotted and bearded seals have shown symptoms as well.

Response: NMFS began receiving reports of the outbreak in summer 2011 and declared an unusual mortality event in December 2011. An investigative team was established, and testing has been underway. Testing has ruled out numerous bacteria and viruses known to affect marine mammals, including Phocine distemper, influenza, Leptospirosis, Calicivirus, orthopoxvirus, and poxvirus. Foreign animal diseases and some domestic animal diseases tested for and found negative include foot and mouth disease, VES, pan picornavirus, and Rickettsial agents. Last month, preliminary radiation testing results were announced which indicate radiation exposure is likely not a factor in the illness. Further quantitative radionuclide testing is occurring this spring. Results will be made publicly available as soon as the analyses are completed.

Reports from the NSB indicate that hunters during early winter observed many healthy bearded and ringed seals. The seals behaved normally: They were playful, curious but cautious, and maintained distance from boats. No lesions were observed on any seals. During December 2011 and January 2012, 20–30 adult ringed seals were harvested from leads in the sea ice in the NSB. Based on local reports, these seals had neither hair loss nor lesions. However, during late February 2012, a young ringed seal with nodular and eroded flipper lesions but no hair loss was harvested. Additionally, necropsy results of the internal organs were consistent with animals with this disease that continues to affect ice seals in the NSB and Bering Strait regions. Chukotka hunters did not report any sightings or harvest of sick and/or hairless seals in December 2011 and January 2012.

NMFS has considered this information as part of its analysis in making the final determinations for this IHA. The data available to date do not indicate that this has weakened the population. Moreover, Shell's activities are anticipated to take less than 1% of the population of all of the stocks of all three species noted by the commenter. The sound that will be produced by Shell's activities is of a low level. Therefore, even if the population were weakened from this outbreak it would not change our evaluation of the impacts of this activity at the population level.

Comment 30: Dr. Bain states that work will be underway during the peak of the beluga calving season, and mothers with calves under 6 months of age are most likely to occur near the drill sites and are the most vulnerable to harm from the project.

Response: While Shell's exploratory drilling program will overlap temporally with the beluga calving season, it will not overlap spatially. Tagging data from the 1990s indicates that belugas from the eastern Beaufort Sea stock will be in

Canadian waters (*i.e.,* Mackenzie Delta and Amundsen Gulf) in the summer (July and August) and do not start migrating through the Beaufort Sea until September but do so far offshore (Richard *et al.,* 2001; DFO, 2000). In the summer months, belugas from the eastern Chukchi Sea stock are typically found in Kasegaluk Lagoon and Kotzebue Sound (Suydam *et al.,* 2001). Shell will transit far offshore so as not to disturb the summer beluga hunts conducted in Kasegaluk Lagoon and therefore will avoid interactions with mothers and calves. Tagging data of belugas from this stock have also indicated that they travel far offshore in the Beaufort Sea to Canadian waters later in the summer (Suydam *et al.,* 2001). Based on this information, it is unlikely that many beluga mother/calf pairs will pass within the 120-dB isopleths of Shell's Camden Bay exploratory drilling program. Mitigation and monitoring measures will ensure that impacts to any belugas that do occur in the vicinity of the program will be at the lowest level practicable.

Comment 31: Dr. Bain states the population censuses for the eastern Chukchi Sea and Beaufort Sea stocks of belugas have not been conducted in the last 10 years and that population trends are unknown. No evidence of population growth was seen when censuses were still being conducted.

Response: In accordance with NMFS' implementing regulations at 50 CFR 216.102(a), NMFS used the best available science to make the requisite findings for issuance of the IHA. That science indicates that only small numbers of belugas will be taken and that those incidental takings will have no more than a negligible impact on the affected beluga stocks and will not have an unmitigable adverse impact on the availability of those belugas for taking for subsistence uses.

Density and Take Estimate Concerns

Comment 32: Shell states that the value of 38 as the maximum estimated take of beluga whales was incorrect in the IHA application. The maximum estimated take of beluga from the *Kulluk* drilling sounds should be 65, not 38. The miscalculation was a result of a cell reference error in the ''Total'' table (Table 6–12 in Shell's IHA application).

Response: NMFS agrees that it continued this error in the proposed IHA by not adding in the potential takes from ice management/icebreaking and the ZVSP airguns. Therefore, NMFS has increased the estimated take of beluga whales from Shell's operations (*i.e.,* use of the *Kulluk,* ice management/icebreaking, and ZVSP airgun usage) to 65. This changes the percentage of stock or population potentially taken from 0.1% to 0.2%.

Comment 33: The NSB and Dr. Bain state that because some bowhead whales have shown responses to noise below 120 dB and only individuals within the 120 dB isopleth were considered taken, NMFS' estimate of take by harassment is likely biased low.

Response: As indicated in the response to *Comment 13,* 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 a reaction would be considered a take. According to experts on marine mammal behavior, whether a particular stressor could potentially disrupt the migration, breathing, nursing, breeding, feeding, or sheltering, etc., of a marine mammal, *i.e.,* whether it would result in a take, is complex and context specific, and it depends on several variables in addition to the received level of the sound by the animals. The 120-dB acoustic criteria is a generalized threshold based on the available data that is intended to assist in the accurate assessment of take while acknowledging that sometimes animals will respond at received levels below that and sometimes they will not respond in a manner considered a take at received levels above 120 dB. NMFS, therefore, does not agree that the estimates of take by harassment are biased low.

Comment 34: AWL states that there is no indication that the proposed IHA considered marine mammal movement during the time period over which the activities will occur. The letter also states that despite the fact that belugas will be migrating in the area, the proposed IHA does not consider their movement when calculating take, citing to the lower beluga densities and a lack of detailed data. Dr. Bain also notes that density and ensonified area can be used to calculate the number of individuals present at any given moment, but different individuals will be present at different times.

Response: During migration, there are clear changes in the density of animals that pass through a particular area of ocean, and ''take'' estimates attempt to consider this. In other situations, it is difficult to account for the movements of individuals within a relatively small area of ocean. Using densities provides the best estimate of animals though it assumes that animals are distributed evenly in the environment, which is not correct. This approach has, however, been used for most statistical approaches to dealing with animals in such situations, and NMFS determined that it is an appropriate and robust approach to use in this instance. In most cases, it overestimates the number of animals actually ''taken'' by the activities because it assumes no avoidance of the area by individuals.

Comment 35: AWL states that NMFS must first account for the movement of marine mammals during the time over which ice management/icebreaking will occur. Also, any final IHA must also assess exactly when Shell's ice management/icebreaking will occur and also consider the effects of both ice management vessels operating simultaneously but at some distance apart. It cannot be assumed that such activities will be neatly confined to the beginning and end of Shell's operations.

Response: See the response to *Comment 34* regarding accounting for the movement of marine mammals. Because it cannot be predicted with absolute certainty as to when ice may be present in the area that could pose a risk to drilling operations, it is difficult to state with absolute certainty when Shell's ice management/icebreaking will occur. Using data on Arctic sea ice presence from recent years, Shell estimated the most likely times that such activities would be required. Shell will also implement an Ice Management Plan (IMP) to ensure real-time ice and weather forecasting is conducted in order to identify conditions that might put operations at risk and will modify activities accordingly. The description of Shell's activities in the proposed IHA indicated that both ice management vessels could be operating simultaneously at different locations and was considered in the analysis.

Comment 36: Dr. Bain states that Shell's Camden Bay drill sites are in a location where the migration corridor is narrow and that this will require nearly all bowheads passing by a drill site while it is active to be exposed to biologically significant levels of noise.

Response: While some bowhead whales show behavioral reactions (*e.g.,* avoidance, increase swim speed, etc.) to drilling and other industry activities, not all behavioral reactions rise to the level of biological significance (NRC, 2000, 2005). Many of the animals that migrate past Shell's operations will do so on the outer edge of the 120-dB isopleth, NMFS' threshold for Level B (behavioral) harassment, where reactions are likely to be less severe. Additionally, Shell will cease operations on August 25 and will not resume until the close of the fall bowhead whale hunts conducted by the communities of Kaktovik and Nuiqsut (which is typically mid- to late

September). Therefore, those whales that pass through the migration corridor during the first few weeks of the migration period will do so during a period of time without any activity being conducted by Shell.

Subsistence Use Concerns

Comment 37: The AEWC and ICAS state that they have expressed concerns about direct impacts to the subsistence hunts resulting from deflection of bowhead whales by vessel traffic and underwater noise, as well as from icebreaking and geophysical exploration. The letters note that concerns about direct and indirect threats to hunting arise from discharge and associated impacts on water quality, the risk of an oil spill, and the cumulative impacts from the sum of all commercial and industrial activities occurring in our waters. Under the MMPA, NMFS has an obligation to ensure that any proposed activities do not have an unmitigable adverse impact on our subsistence activities.

Response: NMFS analyzed the potential impacts from the activities noted here in the proposed IHA and the EA. Potential impacts to the availability of marine mammals for subsistence uses were included in those analyses. Based on the mitigation measures contained in the IHA to ensure the availability of marine mammals for subsistence uses (including a temporary shutdown of activities during the fall bowhead hunt and collection of drilling muds and certain waste streams), NMFS determined that Shell's activities would not have an unmitigable adverse impact on the availability of marine mammal species or stocks for taking for subsistence uses. Additionally, Shell worked independently with the AEWC to develop and sign a CAA, which also includes measures to reduce impacts to bowhead whaling from their drilling operations and other activities.

Comment 38: The AEWC expressed concern about potential impacts to the subsistence hunt in the Chukchi and Bering Seas communities from end of season transits and asks that NMFS address this issue in its response to comments, determining whether vessel transit could impact the fall subsistence hunt in Wainwright, Point Lay, and Point Hope, or the Bering Sea communities. The AEWC also requests that NMFS and Shell amend the Communications Plan in a way that allows Chukchi and Bering Sea communities to be notified when Shell's vessels are approaching subsistence use areas. In the past, whaling captains have asked that Shell begin to transit out of the Chukchi Sea by October 31 for vessels heading to Dutch Harbor or points south.

Response: Shell signed the 2012 CAA with the AEWC on March 26, 2012. In the signed 2012 CAA, Shell agreed to establish Communication Centers in the Chukchi and Bering Sea communities and will conduct such communications in the manner laid out in the CAA. The CAA also requires that vessel transits through the Chukchi Sea should remain as far offshore as weather and ice conditions allow and at all times at least 5 mi (8 km) offshore during transit. Because Shell will abide by these measures, as indicated in the signed CAA and included in the IHA, NMFS has determined that fall vessel transits through the Chukchi Sea will not impact the hunts at Wainwright, Point Lay, and Point Hope. Shell's IHA is valid for drilling operations through October 31. Therefore, demobilization and transit out of the area must begin by that date. Information shared with NMFS from hunters on St. Lawrence Island in 2011 noted that the fall bowhead whale hunts typically occur the week of Thanksgiving. Shell will begin to demobilize and transit south towards Dutch Harbor beginning on October 31 and will avoid being in the area when hunters from Gambell and Savoonga (on St. Lawrence Island) are actively hunting bowhead whales.

Comment 39: The AEWC asks that NMFS require Shell to disclose through the Communications Plan the location of its oil spill response fleet and oil spill tanker in order to ensure that Shell does not station the vessels in a location that could potentially interfere with the fall hunt in Barrow, which often continues after the conclusion of the Nuiqsut and Kaktovik hunts.

Response: As agreed to in the signed CAA, Shell will move the drillship and other related vessels to a location that will not cause interference with the hunts in Kaktovik, Nuiqsut, and Barrow.

Comment 40: The MMC states that negotiating and completing a CAA related to bowhead whales is useful but also prompts the question as to why such agreements are not being developed with subsistence hunters taking other species that might be affected by oil and gas operations. With that in mind, the MMC recommends that NMFS issue the requested IHA contingent upon the successful negotiation of a CAA between Shell and the AEWC and the bowhead whale hunters it represents. Similarly, the MMC recommends that NMFS facilitate the development of more comprehensive CAAs that involve other species and potentially affected communities and co-management organizations and take into account all potential adverse effects on all marine mammal species taken for subsistence purposes.

Response: 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 to some extent beluga) whales, the signing of it is not a requirement. Regulations promulgated pursuant to the 1986 MMPA amendments require that for an activity that will take place near a traditional Arctic hunting ground, or may affect the availability of marine mammals for subsistence uses, an applicant for MMPA authorization must either submit a POC or information that identifies the measures that have been taken to minimize adverse impacts on subsistence uses. Shell submitted a POC with its IHA application, which was available during the public comment period. Additionally, as indicated earlier in this document, Shell signed the 2012 CAA with the AEWC on March 26, 2012.

NMFS (or other Federal agencies) has no authority to require agreements between third parties, and NMFS would not be able to enforce the provisions of CAAs because the Federal government is not a party to the agreements. Regarding the CAA signed with the AEWC, NMFS has reviewed that document, as well as Shell's POC. The majority of the conditions are identical between the two documents. NMFS has also included measures from the 2012 CAA between Shell and the AEWC relevant to ensuring no unmitigable adverse impact on the availability of marine mammals for subsistence uses. NMFS has also determined that the measures in the POC related to species other than the bowhead whale are sufficient to ensure no unmitigable adverse impact on the availability of those species for subsistence uses.

In the recently released Draft EIS on the Effects of Oil and Gas Activities in the Arctic Ocean (NMFS, 2011), NMFS began to examine both the CAA and POC processes. There are strengths and weaknesses in how both processes are currently executed. NMFS is committed to working with the AEWC, Alaska Beluga Whale Committee, and Ice Seal Committee and other stakeholders to improve upon and combine these processes, as appropriate.

Comment 41: The NSB appreciates Shell's effort to mitigate impacts to the bowhead hunt; however, Shell's proposed activities may adversely impact subsistence hunting of other species. Mitigation measures are needed to protect eastern Chukchi Sea belugas and beluga hunters. Restricting transit through the Chukchi Sea until the hunt is completed at Point Lay would be an effective measure. NMFS must also evaluate impacts to seals from the transit of vessels associated with Shell's planned activities and how that may impact seal hunts.

Response: In the proposed IHA, NMFS evaluated potential impacts to subsistence hunts of all species in the project area. Beluga whales and ice seals are not typically hunted in Camden Bay from July through October. The primary periods during which sealing takes place occur outside of Shell's operating time frame, and some of the more established seal hunts that do occur in the Beaufort Sea, such as the Colville delta area hunts, are located a significant distance (in some instances 100 mi [161 km] or more) from Shell's drill sites.

NMFS understands the NSB's concerns regarding vessel transit and how that may affect hunts in the Chukchi Sea communities, especially the summer beluga hunt at Point Lay. Shell has committed to transiting offshore of the hunt and to communicating with Point Lay via the Communication Center regarding vessel transits to ensure that they remain outside of the hunting areas. These measures were part of Shell's POC and are included in the IHA. Therefore, NMFS has determined that there will not be an unmitigable adverse impact on the availability of beluga whales and ice seals for taking for subsistence uses.

Mitigation and Monitoring Concerns

Comment 42: Shell states that the 1,500 ft (457 m) flight altitude restriction mitigation measure applies to all ''non-marine mammal observation'' flights, thus allowing for observer flights to fly lower as needed to afford the best possible marine mammal sightings and identifications.

Response: NMFS concurs. The measure was written in two different ways in several parts of the proposed IHA. One way only exempted takeoffs, landings, and emergency situations from the 1,500 ft (457 m) altitude restriction, while in other parts of the document marine mammal monitoring flights were also exempted. NMFS has eliminated the discrepancy in the final IHA. The exemption now applies to takeoffs, landings, emergency situations, and marine mammal monitoring flights.

Comment 43: The MMC asks how Shell will monitor the large harassment zone of the drill rig to estimate actual numbers of takes? The MMC recommends that NMFS require Shell to develop and employ a more effective means to monitor the entire corrected 120-dB re 1 μPa harassment zone for the presence and movement of bowhead whales and other marine mammals and for estimating the actual number of takes that occur. Monitoring only a portion of the harassment zone and then extrapolating to estimate the total number of takes is reasonable only if the company and NMFS have a basis for making assumptions about the composition and distribution of marine mammals throughout the areas potentially affected.

Response: While the 120-dB harassment zone from the drill rig will likely extend beyond what the observers can effectively see from the drill rig, Shell will place Protected Species Observers (PSOs) on all vessels used for the drilling operations. Many of these vessels will be located several kilometers from the drill rig, thus expanding the visual observation zone. Moreover, Shell will supplement its vessel-based operations with marine mammal aerial observations, thus expanding the visual observation zone. PSOs will be stationed on the vessels to observe from the best vantage points available and will be equipped with ''Big-eyes'' and other binoculars to aid in detection. Additionally, NMFS does not contend that PSOs will be able to see every marine mammal within the harassment zone. Using the vessel-based and aerial platforms to detect and count marine mammal sightings and then to use those observations in conjunction with sightings from other surveys such as BWASP is reasonable for estimating maximum take.

Comment 44: The MMC recommends that NMFS track and enforce Shell's implementation of mitigation and monitoring measures to ensure that they are executed as expected.

Response: During Shell's operating season, NMFS will meet weekly with staff from BOEM, the Bureau of Safety and Environmental Enforcement (BSEE), and the U.S. Fish and Wildlife Service (USFWS) to review and analyze proprietary operations reports, including PSO logs to ensure environmental and regulatory compliance. Additionally, BSEE will have inspectors on the drilling platform 24 hours a day/7 days a week.

Comment 45: The NSB, MMC, and AWL state that NMFS should require Shell to make monitoring data available to the public. The NSB states that in addition to the monitoring data, locations and activities of drill rigs, icebreakers, and support vessels should also be made publicly available.

Response: In accordance with an agreement between NOAA, Shell, ConocoPhillips, and Statoil, data from Shell sponsored science and monitoring efforts and from those that are jointly funded by the signatory parties will be made available to NOAA and to the public. The manner of release, format of released data, site(s) of data repository, and rights of data use are currently being addressed by a working group. Public access to these data is being addressed through this process and would not be enhanced by conditions imposed through the IHA.

Shell has committed to the support and operation of communication centers in Kaktovik, Nuiqsut, Barrow, Wainwright, Point Lay, Point Hope, Kivalina, Kotzebue, St. Lawrence Island, and Wales. As required by the CAA (which Shell signed on March 26, 2012), all Shell vessels operating in the Beaufort and Chukchi Sea will contact the nearest communication center every 6 hours and provide the following information:

(A) Vessel name, operator of vessel, charter or owner of vessel, and the project the vessel is working on;

(B) Vessel location, speed, and direction; and

(C) Plans for vessel movement between the time of the call and the time of the next call. The final call of the day will include a statement of the vessel's general area of expected operations for the following day, if known at that time.

The vessels will also contact the nearest communications center in the event that operations change significantly from those projected during the prior 6 hour reporting period. The communication centers will be generally open and available to the public and will provide a capability for direct communications between subsistence hunters and Shell vessels. Shell will operate these centers for the entire duration of operations in the Chukchi and Beaufort Seas, rather than limiting operations to the periods of the bowhead subsistence hunt.

Since 2010, NMFS has required operators in the Arctic to provide vessel tracks during the season as a part of the required 90 day report. Given that the potentially impacted public are provided with multiple avenues with which they can acquire vessel location and activity data, and that vessel tracks will be made available to the general

public at the end of the season, there is no additional need for real-time public access to vessel location information. Further, given that there are current and legitimate concerns with respect to security of vessels, crew, and operations, public access to vessel locations and activities may not be in the best interest of safe marine operations.

Cumulative Impact Concerns

Comment 46: The MMC noted that it is important to consider that some of the animals may already be in a compromised state as a result of climate disruption, stochastic variation in food resources, or variation in physiological state due to normal life history events (*e.g.,* molting or reproduction in pinnipeds).

Response: In the Notice of Proposed IHA (76 FR 68974, November 7, 2011), NMFS considered others factors, including when pinnipeds and cetaceans conduct varying life history functions and whether or not those activities overlap in time and space with Shell's Camden Bay exploratory drilling program. Pupping and breeding for most ice seals do not occur in Camden Bay. Pupping of ringed seals, which do build subnivean lairs in the Beaufort Sea, occurs outside of Shell's operating time frame in the Beaufort Sea. Additionally, in the EA for this action, NMFS analyzed impacts of other activities and factors, such as climate disruption. Based on this information, NMFS determined that the taking by harassment from Shell's activities would have no more than a negligible impact on the affected marine mammal species or stocks.

Comment 47: Dr. Bain states that cumulative effects are of concern and that the drilling in the Beaufort Sea cannot be considered separately from other planned activities, including similar activities in the Chukchi Sea. Further, if exploratory drilling results in future production, the cumulative effect of production in the core of the migration route needs to be considered.

Response: NMFS analyzed the combination of both of Shell's proposed 2012 drilling programs in its EA, as well as other seismic exploration and vessel transportation in the Beaufort and Chukchi Seas. Additionally, NMFS' response to *Comment 7* explains how other factors were taken into consideration when analyzing this proposal under the MMPA. Because it is unknown if Shell will successfully find oil during its exploratory drilling program, it is premature and speculative to discuss potential impacts from building a production facility in Camden Bay. If Shell finds oil, it would be several years before construction of a production facility would begin. Additional environmental analyses would be required at that time.

ESA Statutory Concerns

Comment 48: AWL notes that the proposed IHA indicates that NMFS will initiate ESA section 7 consultation for three listed marine mammal species but then cites to the Chukchi Sea Notice of Proposed IHA (76 FR 70007, November 9, 2011). NMFS, however, should not overlook bearded and ringed seals in its consultation.

Response: The Notice of Proposed IHA (76 FR 68974, November 7, 2011) for this action noted that NMFS would initiate ESA section 7 consultation for the bowhead whale. However, NMFS has included ringed and bearded seals in the Biological Opinion prepared for this action, which analyzes effects to ESA-listed species, as well as species proposed for listing.

Comment 49: AWL states that the conclusions reached in NMFS' 2008 and 2010 Biological Opinions for oil and gas activities in the Arctic regarding effects of oil spills must be reconsidered.

Response: NMFS' Office of Protected Resources Permits and Conservation Division requested consultation under section 7 of the ESA with the NMFS Alaska Regional Office Endangered Species Division. A new Biological Opinion has been prepared for this IHA. In April, 2012, NMFS finished conducting its section 7 consultation and issued a Biological Opinion, and concluded that the issuance of the IHA associated with Shell's 2012 Beaufort Sea drilling program is not likely to jeopardize the continued existence of the endangered bowhead whale, the Arctic sub-species of ringed seal, or the Beringia distinct population segment of bearded seal. No critical habitat has been designated for these species, therefore none will be affected.

NEPA Statutory Concerns

Comment 50: The AEWC and NSB state that NMFS must include information regarding upcoming oil and gas activities planned for the Beaufort and Chukchi Seas in 2012 in U.S., Russian, and Canadian waters, as well as reasonably foreseeable future drilling activities. Both letters request that NMFS develop a method for assessing impacts from multiple drilling operations and to ascertain the significance of multiple exposures to underwater noise, ocean discharge, and air pollution and vessel traffic.

Response: NMFS' EA contains information on upcoming activities in U.S., Russian, and Canadian waters for the 2012 season, as well as reasonably foreseeable future drilling activities in the project area. The EA qualitatively describes how marine mammals could be impacted from multiple activities in a given season and what the results of those exposures might be.

Comment 51: NSB states that NMFS should be required to prepare an EIS, not an EA, to adequately consider the potentially significant impacts of the proposed IHAs, including the cumulative impacts of Shell's proposed activities.

Response: NMFS' 2012 EA was prepared to evaluate whether significant environmental impacts may result from the issuance of IHAs to Shell for the take of marine mammals incidental to conducting exploratory drilling programs in the U.S. Beaufort and Chukchi Seas, which is an appropriate application of NEPA. After completing the EA, NMFS determined that there would not be significant impacts to the human environment and accordingly issued a FONSI. Therefore, an EIS is not needed for this action.

Comment 52: The NSB states that NMFS should consider the cumulative impact of discharge and whether bioaccumulation of contaminants could have lethal or sub-lethal effects on bowhead whales and other marine mammals. NMFS should then synthesize that information into a health impact assessment looking at the overall combined effect to the health of the local residents.

Response: As explained by the Council on Environmental Quality, an EA is a concise document and should not contain long descriptions or detailed data which the agency may have gathered. Rather, it should contain a brief discussion of the need for the proposal, alternatives to the proposal, the environmental impacts of the proposed action and alternatives, and a list of agencies and persons consulted. See NEPA's Forty Most Asked Questions, 46 FR 18026 (March 23, 1981); 40 CFR 1508.9(b). The EA prepared for this action contains a discussion of water quality, including contaminants, in sections 3.1.5.2 and 4.2.1.5 and incorporates additional material by reference. It also notes that contaminants have the potential to bioaccumulate in marine mammals, but that monitoring has shown that oil and gas developments in the Alaskan Beaufort Sea ''are not contributing ecologically important amounts of petroleum hydrocarbons and metals to the near-shore marine food web of the area'' (EA at 4.2.2.3). Given that the studies done so far have detected no

bioaccumulation of contaminants as a result of oil and gas activity in the Beaufort Sea, it is only a remote and highly speculative possibility that discharges from Shell's exploration drilling program could contribute to cumulative impacts from contaminants that could ultimately result in health impacts to local residents. Agencies are not required to consider such remote or speculative impacts in an EA (see *Ground Zero Ctr. for Non-Violent Action* v. *United States Dept of the Navy,* 383 F.3d 1082, 1090 (9th Cir. 2004)). However, NMFS acknowledges the importance of this issue to residents of the North Slope Borough, and has included a more extensive discussion of environmental contamination and its potential effects in the Draft EIS on Effects of Oil and Gas Activities in the Arctic Ocean (NMFS, 2011).

Comment 53: AWL states that it would be illegal for NMFS to approve the IHA without completing the EIS that is in progress. NSB also states that it would be shortsighted to allow Shell to proceed on a 1-year IHA when the impacts could negatively affect arctic resources and preclude options that could be developed in the forthcoming EIS.

Response: While the Final EIS is still being developed, NMFS conducted a thorough analysis of the affected environment and environmental consequences from exploratory drilling in the Arctic in 2012 and prepared an EA specific to the two exploratory drilling programs proposed to be conducted by Shell. The analysis contained in that EA warranted a Finding of No Significant Impact.

The analysis contained in the Final EIS will apply more broadly to multiple Arctic oil and gas operations over a period of 5 years. NMFS' issuance of IHAs to Shell for the taking of several species of marine mammals incidental to conducting its exploratory drilling operations in the Beaufort and Chukchi Seas in 2012, as analyzed in the EA, is not expected to significantly affect the quality of the human environment. Additionally, the EA contained a full analysis of cumulative impacts.

Oil Spill Concerns

Comment 54: The NSB and MMC state that Shell's application and NMFS' Notice of Proposed IHA (76 FR 68974, November 7, 2011) do not contain adequate information regarding effects of a major oil spill. The MMC notes that NMFS is too dismissive of the potential for a large oil spill. The NSB requests clarification on how NMFS considers the risk of an oil spill when issuing MMPA authorizations for exploratory drilling activities and contends that NMFS must analyze the potential harm to marine mammals and subsistence activities. The NSB also states that Shell's application lacks any information about potential take resulting from a release of oil in any amount.

Response: NMFS' Notice of Proposed IHA contained information regarding measures Shell has instituted to reduce the possibility of a major oil spill during its operations, as well as potential impacts on cetaceans and pinnipeds, their habitats, and subsistence activities (*see* 76 FR 68992–68996, 69001, and 69024, November 7, 2011). NMFS' EA also contains an analysis of the potential effects of an oil spill on marine mammals, their habitats, and subsistence activities. Much of that analysis is incorporated by reference from other NEPA documents prepared for activities in the region. There is no information regarding potential take from a release of oil because an oil spill is not a component of the ''specified activity.''

DOI's BOEM and BSEE are the agencies with expertise in assessing risks of an oil spill. In reviewing Shell's Camden Bay Exploration Plan and Regional OSRP, BOEM and BSEE determined that the risk was low and that Shell will implement adequate measures to minimize the risk. Shell's OSRP: identifies the company's prevention procedures; estimates the potential discharges and describes the resources and steps that Shell would take to respond in the unlikely event of a spill; and addresses a range of spill volumes, ranging from small operational spills to the worst case discharge calculations required to account for the unlikely event of a blowout. Additionally, NOAA's Office of Response and Restoration reviewed Shell's OSRP and provided input to DOI requesting changes that should be made to the plan before it should be approved. Shell incorporated NOAA's suggested changes, which included updating the trajectory analysis and the worst case discharge scenario. Based on these revisions, NOAA Ocean Service's Office of Response and Restoration believes that Shell's plans to respond to an offshore oil spill in the U.S. Arctic Ocean are satisfactory, as described in a memorandum provided to NMFS by the Office of Response and Restoration. Lastly, in the unlikely event of an oil spill, Shell will conduct response activities in accordance with NOAA's Marine Mammal Oil Spill Response Guidelines.

Comment 55: The MMC notes that the risk of an oil spill is not simply a function of its probability of occurrence; it also must take into account the consequences if such a spill occurs. Those consequences are, in part, a function of the spill's characteristics and the ability of the industry and government to mount an effective response. The MMC states: ''The assertion that Shell would be able to respond adequately to any kind of major spill is simply unsupported by all the available evidence.'' The MMC asserts that the OSRP is still inadequate for addressing a large oil spill in the Arctic.

Response: As noted in the response to *Comment 54,* DOI approved Shell's OSRP on March 28, 2012. That approval came after an extensive review process and changes were made to the plan based on comments from DOI, NOAA, and other Federal agencies. The plan calls for Shell to have several response assets near the drill sites for immediate response, while also having additional equipment available for quick delivery, if needed. DOI will also continue to provide oversight with exercises, reviews, and inspections. NMFS' EA and recent BOEM NEPA analyses assess impacts to the environment from an oil spill.

Comment 56: The MMC recommends that NMFS require Shell to cease drilling operations in mid- to late September to reduce the possibility of having to respond to a large oil spill in ice conditions. AWL also states that NMFS should consider restrictions on late-season drilling.

Response: NMFS has determined that such a requirement is unnecessary. Shell requested an IHA to conduct drilling operations through October 31. NMFS analyzed potential impacts to marine mammals, their habitat, and the availability of marine mammals for subsistence uses from Shell's activities being conducted from early July through October. NMFS has concluded that those activities will result in the take of small numbers of marine mammals and that take will have no more than a negligible impact on the affected marine mammal species or stocks and will not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses. Additionally, for its Camden Bay exploratory drilling program, Shell will cease operations on August 25 for the fall bowhead whale hunts conducted by the communities of Kaktovik and Nuiqsut and will not resume until those hunts are deemed closed (which typically occurs in mid- to late September). During this hunting shutdown period, Shell will monitor ice conditions at the drill sites. If those data indicate that it would be too dangerous to return to the drill sites after the close

of the hunts, then Shell will cease operations in Camden Bay for the remainder of the season. Additionally, BOEM will have inspectors on the drill rig 24 hours a day/7 days a week and can call for a shutdown of operations, if necessary.

Comment 57: The MMC recommends that NMFS require Shell to develop and implement a detailed, comprehensive and coordinated Wildlife Protection Plan that includes strategies and sufficient resources for minimizing contamination of sensitive marine mammal habitats and that provides a realistic description of the actions that Shell can take, if any, to respond to oiled or otherwise affected marine mammals. The plan should be developed in consultation with Alaska Native communities (including marine mammal co-management organizations), state and Federal resource agencies, and experienced non-governmental organizations.

Response: As noted in the response to *Comment 54,* Shell will operate any needed oil spill response activities in accordance with NOAA's Marine Mammal Oil Spill Response Guidelines. These guidelines were released to the public as part of NMFS' Programmatic EIS on the Marine Mammal Health and Stranding Response Program and were available for public review at that time. Those guidelines also underwent legal and peer review before being released. Those guidelines are currently being updated based on lessons learned from the Deepwater Horizon spill in the Gulf of Mexico.

Comment 58: AWL states that NMFS should further examine the potential impacts of a major oil spill on bowhead whales. For example, although the proposed IHA notes that a late-season spill could contaminate the spring lead system, it does not appear to consider whether a spill in October could affect both fall and spring migrants (*see* 76 FR 68995).

Response: NMFS' Notice of Proposed IHA (76 FR 68974, November 7, 2011) contains analysis of potential impacts from a late season spill on both fall and spring migrants. The information regarding whales migrating past the Camden Bay drill sites in the fall is found on the same page in the **Federal Register** notice noted by AWL in its comment. That analysis notes that the fall migration would not be completed if a spill were to occur in the fall and that some animals migrate close to shore. If fall migrants were moving through leads in the pack ice or were concentrated in nearshore waters, some bowhead whales might not be able to avoid oil slicks and could be subject to prolonged contamination. However, the autumn migration past Camden Bay extends over several weeks, and some of the whales travel along routes north of the area, thereby reducing the number of whales that could approach patches of spilled oil. Additionally, vessel activity associated with spill cleanup efforts may deflect whales traveling near Camden Bay farther offshore, thereby reducing the likelihood of contact with spilled oil. Also, during years when movements of oil and whales might be partially confined by ice, the bowhead migration corridor tends to be farther offshore (Treacy, 1997; LGL and Greeneridge, 1996a; Moore, 2000).

Comment 59: AWL states that NMFS should also revisit the proposed IHA's conclusions as to the effects of an oil spill on beluga whales. It is unclear why the Beaufort Sea stock's migration into the Beaufort Sea in the spring results in the conclusion that an oil spill in summer would ''not be expected to have major impacts.''

Response: The migration patterns and recorded locations of beluga whales from the Beaufort Sea stock indicate that the majority of these animals are not located in the U.S. Beaufort Sea in July and August, although some individuals may remain in the area. Therefore, if a spill were to happen after Shell is on location in Camden Bay (after July 1) in July or August, few (if any) beluga whales would be in the vicinity. Based on this, NMFS determined that major impacts would not be expected if a spill occurred at this time and were cleaned up before the animals began migrating back through the U.S. Beaufort Sea.

Proposed IHA Language Concerns

The comments and concerns contained in this grouping relate to the language that was contained in the Notice of Proposed IHA (76 FR 69024–69027, November 7, 2011) in the section titled ''Proposed Incidental Harassment Authorization.'' The commenters requested clarification or changes to some of the specific wording of the conditions that would be contained in the issued IHA. The referenced condition in the proposed IHA is noted in the comments here. Numbers of the conditions match the proposed IHA and may differ slightly from the issued IHA.

Comment 60: Regarding Condition 1, Shell asks that the IHA become effective on July 1 instead of July 10 since the company will begin transiting into the Chukchi Sea on July 1 (but not before), if weather permits, and could therefore arrive on location at the Torpedo or Sivulliq prospects before July 10.

Response: NMFS has made the requested change. Changing the date from July 10 to July 1 does not alter any of the analyses contained in the proposed IHA.

Comment 61: Regarding Condition 2, Shell asks that the language of the IHA not limit the incidental takings from authorized sound sources to those made while only on Shell lease holdings because ice management activities may occur beyond the lease boundaries and the continuous noise of the drillship may extend beyond the limits of Shell's lease holdings.

Response: NMFS has retained the first sentence of Condition 2, as originally proposed, which states that only activities associated with Shell's 2012 Camden Bay exploration plan are covered by the IHA. Because the exploration plan describes the locations of activities, NMFS has determined that language is legally sufficient. NMFS understands, and did analyze, that ice management may at times occur 25 mi (40 km) from the actual drill site. Additionally, NMFS analyzed the propagation and sound isopleths of the drill rig, which may attenuate beyond the actual lease holding itself.

Comment 62: Regarding Condition 3(a), Shell requests that narwhal be included in the list of species for which incidental take is authorized.

Response: As noted in the Notice of Proposed IHA (76 FR 68974, November 7, 2011), NMFS determined that presence of narwhal in the U.S. Beaufort Sea is rare and extralimital. Encounters are unlikely.

Comment 63: Regarding Condition 7(a), Shell asks whether the response they provided to NMFS on July 29, 2011, for a definition of ''group'' is consistent with the intent meant by NMFS in the **Federal Register** notice. As a general practice, Shell will adopt a definition of a group as being three or more whales observed within a 547-yd (500-m) area and displaying behaviors of directed or coordinated activity (*e.g.,* group feeding).

Response: NMFS agrees with this definition and will add the following sentence to Condition 7(a): ''For purposes of this Authorization, a group is defined as being three or more whales observed within a 547-yd (500-m) area and displaying behaviors of directed or coordinated activity (*e.g.,* group feeding).''

Comment 64: Shell requests that Condition 7(e) be modified to match with the language contained in Condition 9(e), which allows marine mammal monitoring flights to also fly below the 1,500 ft (457 m) altitude restriction. In the proposed IHA, those two conditions contradicted on another.

Response: NMFS agrees that Condition 7(e) should be rewritten to match Condition 9(e). The condition now reads as follows: ''Aircraft shall not fly within 1,000 ft (305 m) of marine mammals or below 1,500 ft (457 m) altitude (except during marine mammal monitoring, takeoffs, landings, or in emergency situations) while over land or sea.''

Comment 65: Regarding Condition 7(f), Shell asks if the length of daily duty restrictions included in the measure apply only to the drillship and ice management vessels or to all vessels, including smaller support vessels. Shell's view is that the remainder of support vessels, not included as ''sound sources,'' will have fewer observers than either the drillship or ice management vessels (mainly due to bunk space), which will be sufficient to cover marine mammal observations.

Response: NMFS concurs that the watch requirements were meant to apply to the drillship and two ice management vessels. PSOs will be required to be stationed on the other support vessels. However, they will not need to be on watch 24 hours a day, as those vessels are not always active 24 hours a day. PSOs will need to be on watch when the smaller support vessels are active, such as for supply transport.

Comment 66: Regarding Condition 7(g)(iv), Shell requests that the requirement to measure water temperature be removed as a stipulation under this measure given that it lacks material value to the recording of marine observations and adherence to other more salient mitigation measures.

Response: NMFS included the recording of water temperature along with other more salient data collection parameters in the proposed IHA because it was included in Shell's original 4MP. After further discussion with Shell, NMFS agrees that it is not necessary to record water temperature each time a marine mammal is sighted and has removed the requirement from the IHA, and Shell has removed it from its monitoring plan.

Comment 67: Shell acknowledges that they have voluntarily elected to institute Condition 9(f) as a subsistence mitigation measure. However, they do not concur with the implied assertion in the heading of Condition 9 ''Subsistence Mitigation Measures'' that this measure is a necessity ''to ensure no unmitigable adverse impact on subsistence uses of marine mammals.''

Response: NMFS will move this condition from section 9 of the IHA (''Subsistence Mitigation Measures'') to section 7 (''General Mitigation and Monitoring Requirements''). NMFS acknowledges that collection of drilling mud and cuttings and certain other waste streams is a voluntary decision on the part of Shell. While the inclusion of this measure was part of NMFS' analysis and used in making the negligible impact and no unmitigable adverse impact to subsistence uses findings, the absence of such a measure likely would not have altered the conclusion for those two findings.

Comment 68: The AEWC requests that Condition 10(c)(i) include a date certain for Shell to carry out the SSV. Shell requests that this condition, as well as Condition 11(a), include language reflecting the flexibility of providing the drilling sounds on a ''rolling'' basis. Shell states that SSVs for the drilling vessel will necessitate that recordings of the various sounds of the drilling program continue throughout the drilling season. Hence, all drilling program sounds will not be available within 5 days of initiating drilling. Instead, Shell volunteers to provide to NMFS a ''rolling'' transmission of recorded drilling program sounds throughout the drilling program.

Response: NMFS concurs that a ''rolling'' transmission of sound signatures is appropriate based on the fact that different activities will be conducted at various times throughout the open-water season. In order to capture all of the different sound signatures and for that data to be transmitted to NMFS, it is not appropriate to do it all in the first 5 days but rather to collect the data on a real-time basis. Spectrograms will be calculated daily, and all information will be included in a weekly report that discusses the drillship and vessel activities that occurred during the week. Language has been included in the IHA to reflect this weekly reporting requirement.

Comment 69: Regarding Condition 10(c)(ii), Shell asks that the phrase ''to the extent practical'' precede the last sentence of the measure. Shell fully intends to deploy and execute the study as designed. However, conditional temporal and spatial factors, such as ice at the locations for deployment of acoustic recorders could cause some recorders to not be deployed or to be deployed at alternate locations.

Response: NMFS has made the requested language change to the condition.

Comment 70: Regarding Condition 11(d), Shell requests that the IHA stipulate that the comprehensive report be due 240 days from the end of the drilling season instead of 240 days from the date of issuance, since the IHA is being issued months before the start of the program.

Response: NMFS agrees and has rewritten the condition to state that the comprehensive report is due 240 days from the date of expiration of the IHA (*i.e.,* 240 days from October 31, 2012).

Description of Marine Mammals in the Area of the Specified Activity

The Beaufort Sea supports a diverse assemblage of marine mammals, including: Bowhead, gray, beluga, killer (*Orcinus orca*), minke (*Balaenoptera acutorostrata*), and humpback (*Megaptera novaeangliae*) whales; harbor porpoises; ringed, ribbon, spotted, and bearded seals; narwhal; polar bears (*Ursus maritimus*); and walruses (*Odobenus rosmarus divergens;* see Table 4–1 in Shell's application). The bowhead and humpback whales are listed as ''endangered'' under the 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 are proposed for listing under the ESA; however, none of those stocks or populations occur in the activity area. On December 10, 2010, NMFS published a notice of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notice 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 of these two ice seal species is considered depleted under the MMPA. Additionally, the ribbon seal is considered a ''species of concern'' under the ESA. Both the walrus and the polar bear are managed by the USFWS and are not considered further in this IHA.

Of these species, eight are expected to occur in the area of Shell's proposed operations. These species include: the bowhead, gray, and beluga whales, harbor porpoise, and the ringed, spotted, bearded, and ribbon seals. The marine mammal species that is likely to be encountered most widely (in space and time) throughout the period of the drilling program is the ringed seal. Bowhead whales are also anticipated to occur in the project area more frequently than the other cetacean species; however, their occurrence is not expected until later in the season. Even though harbor porpoise and ribbon seals are not typically sighted in Camden Bay, there have been recent sightings in the Beaufort Sea near the Prudhoe Bay area, so their occurrence could not be completely ruled out. Additional information about species occurrence in the project area was

provided in the Notice of Proposed IHA (76 FR 68974, November 7, 2011). Where available, Shell used density estimates from peer-reviewed literature in the application. In cases where density estimates were not readily available in the peer-reviewed literature, Shell used other methods to derive the estimates. NMFS reviewed the density estimate descriptions and articles from which estimates were derived and requested additional information to better explain the density estimates presented by Shell in its application. This additional information was included in the revised IHA application. The explanation for those derivations and the actual density estimates are described later in this document (see the ''Estimated Take by Incidental Harassment'' section).

Shell's application contains information on the status, distribution, seasonal distribution, abundance, and life history of each of the species under NMFS jurisdiction mentioned in this document. When reviewing the application, NMFS determined that the species descriptions provided by Shell correctly characterized the status, distribution, seasonal distribution, and abundance of each species. Please refer to the application for that information (see **ADDRESSES**). Additional information can also be found in the NMFS SARs. The Alaska 2010 and 2011 Draft SARs are available at: *http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2010.pdf* and *http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2011_draft.pdf,* respectively.

Brief Background on Marine Mammal Hearing

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data. Southall *et al.* (2007) designate ''functional hearing groups'' for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (13 species of mysticetes): Functional hearing is estimated to occur between approximately 7 Hz and 22 kHz (however, a study by Au *et al.* (2006) of humpback whale songs indicate that the range may extend to at least 24 kHz);
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): Functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (eight species of true porpoises, six species of river dolphins, Kogia, the franciscana, and four species of cephalorhynchids): Functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in Water: Functional hearing is estimated to occur between approximately 75 Hz and 75 kHz, with the greatest sensitivity between approximately 700 Hz and 20 kHz.

As mentioned previously in this document, eight marine mammal species (four cetacean and four pinniped species) are likely to occur in the exploratory drilling area. Of the four cetacean species likely to occur in Shell's project area, two are classified as low frequency cetaceans (*i.e.,* bowhead and gray whales), one is classified as a mid-frequency cetacean (*i.e.,* beluga whales), and one is classified as a high-frequency cetacean (*i.e.,* harbor porpoise) (Southall *et al.,* 2007). Additional information regarding marine mammal hearing and sound production is contained in the Notice of Proposed IHA (76 FR 68974, November 7, 2011).

Potential Effects of the Specified Activity on Marine Mammals

The likely or possible impacts of the exploratory drilling program in Camden Bay on marine mammals could involve both non-acoustic and acoustic effects. Potential non-acoustic effects could result from the physical presence of the equipment and personnel. Petroleum development and associated activities introduce sound into the marine environment. Impacts to marine mammals are expected to primarily be acoustic in nature. Potential acoustic effects on marine mammals relate to sound produced by drilling activity, vessels, and aircraft, as well as the ZVSP airgun array. The potential effects of sound from the exploratory drilling program 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.,* 1995a). However, for reasons discussed in the proposed IHA, it is unlikely that there would be any cases of temporary, or especially permanent, hearing impairment resulting from these activities.

In the ''Potential Effects of the Specified Activity on Marine Mammals'' section of the Notice of Proposed IHA (76 FR 68974, November 7, 2011), NMFS included a qualitative discussion of the different ways that Shell's 2012 Camden Bay exploratory drilling program may potentially affect marine mammals. That discussion focused on information and data regarding potential acoustic and non-acoustic effects from drilling activities (*i.e.,* use of the drillship, icebreakers, and support vessels and aircraft) and use of airguns during ZVSP surveys. Marine mammals may experience masking and behavioral disturbance. The information contained in the ''Potential Effects of Specified Activities on Marine Mammals'' section from the proposed IHA has not changed. Please refer to the proposed IHA for the full discussion (76 FR 68974, November 7, 2011).

Exploratory Drilling Program and Potential for Oil Spill

As noted above, the specified activity involves the drilling of exploratory wells and associated activities in the Beaufort Sea during the 2012 open-water season. The impacts to marine mammals that are reasonably expected to occur will be acoustic in nature. In response to previous IHA applications submitted by Shell, various entities have asserted that NMFS cannot authorize the take of marine mammals incidental to exploratory drilling under an IHA. Instead, they contend that incidental take can be allowed only with a letter of authorization (LOA) issued under five-year regulations because of the potential that an oil spill will cause serious injury or mortality.

There are two avenues for authorizing incidental take of marine mammals under the MMPA. NMFS may, depending on the nature of the anticipated take, authorize the take of marine mammals incidental to a specified activity through regulations and LOAs or annual IHAs. *See* 16 U.S.C. 1371(a)(5)(A) and (D). In general, regulations (accompanied by LOAs) may be issued for any type of take (*e.g.,* Level B harassment (behavioral disturbance), Level A harassment (injury), serious injury, or mortality), whereas IHAs are limited to activities that result only in harassment (*e.g.,* behavioral disturbance or injury). Following the 1994 MMPA Amendments, NMFS promulgated implementing regulations governing the issuance of IHAs in Arctic waters. See 60 FR 28379 (May 31, 1995) and 61 FR

15884 (April 10, 1996). NMFS stated in the preamble of the proposed rulemaking that the scope of IHAs would be limited to ''* * * those authorizations for harassment involving incidental harassment that may involve *non-serious injury.''* See 60 FR 28380 (May 31, 1995; emphasis added); 50 CFR 216.107(a). (''[e]xcept for activities that have the potential to result in serious injury or mortality, which must be authorized under 216.105, incidental harassment authorizations may be issued, * * * to allowed activities that may result in only the incidental harassment of a small number of marine mammals.''). NMFS explained further that applications would be reviewed to determine whether the activity would result in more than harassment and if so, the agency would either (1) attempt to negate the potential for serious injury through mitigation requirements, or (2) deny the incidental harassment authorization and require the applicant to apply for incidental take regulations. See id. at 28380–81.

NMFS' determination of whether the type of incidental take authorization requested is appropriate occurs shortly after the applicant submits an application for an incidental take authorization. The agency evaluates the proposed action and all information contained in the application to determine whether it is adequate and complete and whether the type of taking requested is appropriate. *See* 50 CFR 216.104; *see also* 60 FR 28380 (May 31, 1995). Among other things, NMFS considers the specific activity or class of activities that can reasonably be *expected* to result in incidental take; the *type* of incidental take authorization that is being requested; and the *anticipated* impact of the activity upon the species or stock and its habitat. See id. at 216.104(a). (emphasis added). Any application that is determined to be incomplete or inappropriate for the type of taking requested will be returned to the applicant with an explanation of why the application is being returned. See id. Finally, NMFS evaluates the best available science to determine whether a proposed activity is reasonably expected or likely to result in serious injury or mortality.

NMFS evaluated Shell's incidental take application for its proposed 2012 drilling activities in light of the foregoing criteria and has concluded that Shell's request for an IHA is warranted. Shell submitted information with its IHA Application indicating that an oil spill (large or very large oil spill) is highly unlikely and thus not reasonably expected to occur during the course of exploration drilling or ZVSP surveys. *See* Camden Bay IHA Application, pp. 3 and Attachment E—Analysis of the Probability of an ''Unspecified Activity'' and Its Impacts: Oil Spill. In addition, Shell's 2012 Exploration Plan, which was conditionally approved by the Department of the Interior, indicates there is a ''very low likelihood of a large oil spill event.'' *See* Shell Offshore, Inc.'s Revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Beaufort Sea, Alaska (May 2011), at p. 8–1; *see also,* Appendix F to Shell's Revised Outer Continental Shelf Lease Exploration Plan, at p. 4–174; *see also,* Beaufort Sea Planning Area Environmental Assessment for Shell Offshore, Inc.'s 2012 Revised Outer Continental Shelf Lease Exploration Plan (August 2011).

The likelihood of a large or very large (*i.e.* ≥1,000 barrels or ≥150,000 barrels, respectively) oil spill occurring during Shell's proposed program has been estimated to be low. A total of 35 exploration wells have been drilled between 1982 and 2003 in the Chukchi and Beaufort seas, and there have been no blowouts. In addition, no blowouts have occurred from the approximately 98 exploration wells drilled within the Alaskan OCS (MMS, 2007a; BOEMRE, 2011). Attachment E in Shell's IHA Application contains information regarding the probability of an oil spill occurring during the proposed program and the potential impacts should one occur. Based on modeling conducted by Bercha (2008), the predicted frequency of an exploration well oil spill in waters similar to those in Camden Bay, Beaufort Sea, Alaska, is 0.000612 per well for a blowout sized between 10,000 barrels (bbl) to 149,000 bbl and 0.000354 per well for a blowout greater than 150,000 bbl. Please refer to Shell's application for additional information on the model and predicted frequencies (see **ADDRESSES**).

Shell has implemented several design standards and practices to reduce the already low probability of an oil spill occurring as part of its operations. The wells proposed to be drilled in the Arctic are exploratory and will not be converted to production wells; thus, production casing will not be installed, and the well will be permanently plugged and abandoned once exploration drilling is complete. Shell has also developed and will implement the following plans and protocols: Shell's Critical Operations Curtailment Plan; IMP; Well Control Plan; and Fuel Transfer Plan. Many of these safety measures are required by DOI's interim final rule implementing certain measures to improve the safety of oil and gas exploration and development on the OCS in light of the Deepwater Horizon event (see 75 FR 63346, October 14, 2010). Operationally, Shell has committed to the following to help prevent an oil spill from occurring in the Beaufort Sea:

- Shell's Blow Out Preventer (BOP) was inspected and tested by an independent third party specialist;
- Further inspection and testing of the BOP have been performed to ensure the reliability of the BOP and that all functions will be performed as necessary, including shearing the drill pipe;
- Subsea BOP hydrostatic tests will be increased from once every 14 days to once every 7 days;
- A second set of blind/shear rams will be installed in the BOP stack;
- Full string casings will typically not be installed through high pressure zones;
- Liners will be installed and cemented, which allows for installation of a liner top packer;
- Testing of liners prior to installing a tieback string of casing back to the wellhead;
- Utilizing a two-barrier policy; and
- Testing of all casing hangers to ensure that they have two independent, validated barriers at all times.

NMFS has considered Shell's proposed action and has concluded that there is no reasonable likelihood of serious injury or mortality from the 2012 Camden Bay exploration drilling program. NMFS has consistently interpreted the term ''potential,'' as used in 50 CFR 216.107(a), to only include impacts that have more than a discountable probability of occurring, that is, impacts must be reasonably expected to occur. Hence, NMFS has regularly issued IHAs in cases where it found that the potential for serious injury or mortality was ''highly unlikely'' (*See* 73 FR 40512, 40514, July 15, 2008; 73 FR 45969, 45971, August 7, 2008; 73 FR 46774, 46778, August 11, 2008; 73 FR 66106, 66109, November 6, 2008; 74 FR 55368, 55371, October 27, 2009).

Interpreting ''potential'' to include impacts with any probability of occurring (*i.e.,* speculative or extremely low probability events) would nearly preclude the issuance of IHAs in every instance. For example, NMFS would be unable to issue an IHA whenever vessels were involved in the marine activity since there is always some, albeit remote, possibility that a vessel could strike and seriously injure or kill a marine mammal. This would be inconsistent with the dual-permitting scheme Congress created and

undesirable from a policy perspective, as limited agency resources would be used to issue regulations that provide no additional benefit to marine mammals beyond what can be achieved with an IHA.

Despite concluding that the risk of serious injury or mortality from an oil spill in this case is extremely remote, NMFS nonetheless evaluated the potential effects of an oil spill on marine mammals. While an oil spill is not a component of Shell's specified activity, potential impacts on marine mammals from an oil spill are discussed in more detail in the Notice of Proposed IHA (76 FR 68974, November 7, 2011) and NMFS' EA. Please refer to those documents for the discussion.

Anticipated Effects on Marine Mammal Habitat

The primary potential impacts to marine mammals and other marine species are associated with elevated sound levels produced by the exploratory drilling program (*i.e.* the drillship and the airguns). However, other potential impacts are also possible to the surrounding habitat from physical disturbance and an oil spill (should one occur). The proposed IHA contains a full discussion of the potential impacts to marine mammal habitat and prey species in the project area. No changes have been made to that discussion. Please refer to the proposed IHA for the full discussion of potential impacts to marine mammal habitat (76 FR 68974, November 7, 2011). NMFS has determined that Shell's exploratory drilling program is not expected to have any habitat-related effects that could cause significant or long-term consequences for marine mammals or on the food sources that they utilize.

Mitigation

In order to issue an incidental take authorization (ITA) under Sections 101(a)(5)(A) and (D) of the MMPA, NMFS must, where applicable, 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 (where relevant). This section summarizes the contents of Shell's Marine Mammal Monitoring and Mitigation Plan (4MP).

Operational Mitigation Measures

Shell submitted a 4MP as part of its application (Attachment C; see **ADDRESSES**). Shell submitted a revised 4MP after the plan was reviewed by an independent peer review panel (see the ''*Monitoring Plan Peer Review*'' section for additional details). The revised plan is also available to the public (see **ADDRESSES**). The planned offshore drilling program incorporates both design features and operational procedures for minimizing potential impacts on marine mammals and on subsistence hunts. The design features and operational procedures have been described in the IHA and LOA applications submitted to NMFS and USFWS, respectively, and are summarized here. Survey design features include:

- Timing and locating drilling and support activities to avoid interference with the annual fall bowhead whale hunts from Kaktovik, Nuiqsut (Cross Island), and Barrow;
- Identifying transit routes and timing to avoid other subsistence use areas and communicating with coastal communities before operating in or passing through these areas;
- Conducting pre-season sound propagation modeling to establish the appropriate exclusion and behavioral radii; and
- Modifications to the *Kulluk* to reduce sound propagation into the water (as described in greater detail earlier in this document).

Shell indicates, and we agree, that the potential disturbance of marine mammals during operations will be minimized further through the implementation of several ship-based mitigation measures, which include establishing and monitoring safety and disturbance zones, vessel operation protocols, and shutting down activities for a portion of the open-water season.

Exclusion radii for marine mammals around sound sources are customarily defined as the distances within which received sound levels are greater than or equal to 180 dB re 1 μPa (rms) for cetaceans and greater than or equal to 190 dB re 1 μPa (rms) for pinnipeds. These exclusion criteria are based on an assumption that sounds at lower received levels will not injure these animals or impair their hearing abilities, but that higher received levels might have such effects. It should be understood that marine mammals inside these exclusion zones will not necessarily be injured, as the received sound thresholds which determine these zones were established prior to the current understanding that significantly higher levels of sound would be required before injury could occur (see Southall *et al.,* 2007). With respect to Level B harassment, NMFS' practice has been to apply the 120 dB re 1 μPa (rms) received level threshold for underwater continuous sound levels and the 160 dB re 1 μPa (rms) received level threshold for underwater impulsive sound levels.

Shell proposes to monitor the various radii in order to implement any mitigation measures that may be necessary. Initial radii for the sound levels produced by the *Kulluk* and *Discoverer,* the icebreaker, and the airguns have been modeled. Sounds from the *Kulluk* have previously been measured in the Beaufort Sea (Greene, 1987a; Miles *et al.,* 1987). The broadband back-propagated source level estimated by Greene (1987a) from these measurements was 185 dB re 1 μPa rms. These measurements were used as a proxy for modeling the sounds likely to be produced by exploration drilling activities from the *Kulluk* (Zykov and Hannay, 2007). Measurements taken by Austin and Warner (2010) indicated broadband source levels between 177 and 185 dB re 1 μPa rms for the *Discoverer.* Measurements of the icebreaking supply ship *Robert Lemeur* pushing and breaking ice during exploration drilling operations in the Beaufort Sea in 1986 resulted in an estimated broadband source level of 193 dB re 1 μPa rms (Greene, 1987a; Richardson *et al.,* 1995a). Based on a similar airgun array used in the shallow waters of the Beaufort Sea in 2008 by BP, the source level of the airgun is predicted to be 241.4 dB re 1 μPa rms. Once on location in Camden Bay, Shell will conduct SSV tests to establish safety zones for the previously mentioned sound level criteria. The objectives of the SSV tests are: (1) To quantify the absolute sound levels produced by drilling and to monitor their variations with time, distance, and direction from the drillship; and (2) to measure the sound levels produced by vessels operating in support of exploration drilling operations, which include crew change vessels, tugs, ice-management vessels, and spill response vessels. The methodology for conducting the SSV tests is fully described in Shell's 4MP (see **ADDRESSES**). Please refer to that document for further details. Upon completion of the SSV tests, the new radii will be established and monitored, and mitigation measures will be implemented in accordance with Shell's 4MP.

Based on the best available scientific literature, the source levels noted earlier in this document and in Shell's 4MP for the drillships are not high enough to cause a temporary reduction in hearing sensitivity or permanent hearing damage to marine mammals.

Consequently, Shell believes that mitigation as described for seismic activities including ramp ups, power downs, and shutdowns should not be necessary for drilling activities. NMFS has also determined that these types of mitigation measures, traditionally required for seismic survey operations, are not practical or necessary for this drilling activity. Seismic airgun arrays can be turned on slowly (*i.e.,* only turning on one or some guns at a time) and powered down quickly. The types of sound sources used for exploratory drilling have different properties and are unable to be ''powered down'' like airgun arrays or shutdown instantaneously without posing other risks to operational and human safety. However, Shell plans to use PSOs (formerly referred to as marine mammal observers) onboard the drillship and the various support vessels to monitor marine mammals and their responses to industry activities and to initiate mitigation measures should in-field measurements of the operations indicate that such measures are necessary. Additional details on the PSO program are described in the ''Monitoring and Reporting'' section found later in this document. Also, for the ZVSP activities, Shell will implement standard mitigation procedures, such as ramp ups, power downs, and shutdowns.

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 ZVSP surveys, Shell will ramp up the airgun arrays slowly. Full ramp ups (*i.e.,* from a cold start when no airguns have been firing) will begin by firing a single airgun in the array. A full ramp up will not begin until there has been a minimum of 30 minutes of observation of the 180-dB and 190-dB exclusion zones for cetaceans and pinnipeds, respectively, by PSOs to assure that no marine mammals are present. The entire exclusion zone must be visible during the 30-minutes 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 applicable exclusion zone or the animal(s) is not sighted for at least 15 minutes for small odontocetes and pinnipeds or 30 minutes for baleen whales.

A power down is the immediate reduction in the number of operating energy sources from all firing to some smaller number. A shutdown is the immediate cessation of firing of all energy sources. The arrays will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable exclusion zone of the full arrays but is outside the applicable exclusion zone of the single source. If a marine mammal is sighted within the applicable exclusion zone of the single energy source, the entire array will be shutdown (*i.e.,* no sources firing). The same 15 and 30 minute sighting times described for ramp up also apply to starting the airguns again after either a power down or shutdown.

Additional mitigation measures include: (1) Reducing speed and/or changing course if a whale is sighted within 300 yards (274 m) from a vessel; (2) reducing speed in inclement weather; (3) checking the water immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged; (4) resuming full activity (*e.g.,* full support vessel speed) only after marine mammals are confirmed to be outside the safety zone; (5) implementing flight restrictions prohibiting aircraft from flying below 1,500 ft (457 m) altitude (except during marine mammal monitoring, takeoffs and landings, or in emergency situations); and (6) keeping vessels anchored when approached by marine mammals to avoid the potential for avoidance reactions by such animals.

Shell will also implement additional mitigation measures to ensure no unmitigable adverse impact on the availability of affected species or stocks for taking for subsistence uses. Those measures are described in the ''Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses'' section found later in this document.

Oil Spill Response Plan

In accordance with BSEE regulations, Shell developed an OSRP for its Camden Bay exploration drilling program. A copy of this document can be found on the Internet at: *http://www.bsee.gov/OSRP/Beaufort-Sea-OSRP.aspx.* Additionally, in its POC, Shell has agreed to several mitigation measures in order to reduce impacts during the response efforts in the unlikely event of an oil spill. Those measures are detailed in the ''*Plan of Cooperation (POC)''* section found later in this document. In the unlikely event of a spill, Shell has also agreed to operate, to the maximum extent practicable, in accordance with NOAA's Marine Mammal Oil Spill Response Guidelines, which are available on the Internet at: *http://www.nmfs.noaa.gov/pr/pdfs/health/eis_appendixl.pdf.* BSEE issued approval of Shell's Beaufort Sea OSRP on March 28, 2012. That approval was issued after review of the plan by BSEE in cooperation with other Federal and state agency partners, including NOAA. Many of the changes to the approved OSRP reflect comments from NOAA, such as revising the worst case discharge scenario and providing trajectories of the worst case discharge over a 30-day period instead of a 72-hour period.

NMFS has carefully evaluated Shell'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.

Measures to ensure availability of such species or stock for taking for certain subsistence uses are discussed later in this document (see ''Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses'' section).

Monitoring and Reporting

In order to issue an ITA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must, where applicable, 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 action area.

Monitoring Measures

The monitoring plan proposed by Shell in the IHA application can be

found in the 4MP (Attachment C of Shell's application; see **ADDRESSES**). Shell's revised 4MP is also available to the public (see **ADDRESSES**). The plan was modified based on comments received from the peer review panel (see the ''*Monitoring Plan Peer Review''* section later in this document). A summary of the primary components of the plan can be found in the Notice of Proposed IHA (76 FR 68974, November 7, 2011). A shorter description is contained here, with only components of the 4MP that have been modified summarized in greater detail here.

(1) Vessel-Based PSOs

Vessel-based monitoring for marine mammals will be done by trained PSOs throughout the period of drilling operations on all vessels. PSOs will monitor the occurrence and behavior of marine mammals near the drillship during all daylight periods during operation and during most daylight periods when drilling operations are not occurring. PSO duties will include watching for and identifying marine mammals, recording their numbers, distances, and reactions to the drilling operations. A sufficient number of PSOs will be required onboard each vessel to meet the following criteria: (1) 100% monitoring coverage during all periods of drilling 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. Shell anticipates that there will be provision for crew rotation at least every 3–6 weeks to avoid observer fatigue.

PSOs will watch for marine mammals from the best available vantage point on the drillship and support vessels. Maximizing time with eyes on the water is strongly promoted during training and is a goal of the PSO program. Each ship will have voice recorders available to PSOs. This will allow PSOs to remain focused on the water in situations where a number of sightings occur together. Additionally, Shell has transitioned entirely to real-time electronic data recording and automated as much of the process as possible to minimize time spent recording data as opposed to focusing eyes on the water.

PSOs are instructed to identify animals as unknown when appropriate rather than strive to identify an animal when there is significant uncertainty. Shell also asks that they provide any sightings cues they used and any distinguishable features of the animal even if they are not able to identify the animal and record it as unidentified. Emphasis is also placed on recording what was not seen, such as dorsal features.

PSOs will be able to plot sightings in near real-time for their vessel. Significant sightings from key vessels (drill rigs, ice management, anchor handlers and aircraft) will be relayed between platforms to keep observers aware of animals that may be in or near the area but may not be visible to the observer at any one time. Emphasis will be placed on relaying sightings with the greatest potential to involve mitigation or reconsideration of a vessel's course (*e.g.,* large group of bowheads, walruses on ice). Data will also be collected to further evaluate night vision equipment.

(2) Aerial Survey Program

Shell proposes to conduct an aerial survey program in support of the drilling program in the Beaufort Sea during the summer and fall of 2012. Shell's objectives for this program include:

(A) To advise operating vessels as to the presence of marine mammals (primarily cetaceans) in the general area of operation;

(B) To collect and report data on the distribution, numbers, movement and behavior of marine mammals near the exploration drilling operations with special emphasis on migrating bowhead whales;

(C) To support regulatory reporting related to the estimation of impacts of exploration drilling operations on marine mammals;

(D) To investigate potential deflection of bowhead whales during migration by documenting how far east of exploration drilling operations a deflection may occur and where whales return to normal migration patterns west of the operations;

(E) To collect marine mammal sighting data using both PSOs and digital media, and after the field season, to compare the data recorded by the two methods; and

(F) To monitor the accessibility of bowhead whales to Inupiat hunters.

Aerial survey flights will begin 5 to 7 days before operations at the exploration well sites get underway. Surveys will be flown daily throughout drilling operations, weather and flight conditions permitting, and continue for 5 to 7 days after all activities at the site have ended. Since drafting the original 4MP in May 2011, Shell has agreed to add digital cameras and high definition (HD) video cameras on the survey aircraft to capture imagery that can later be compared to data collected by the PSOs.

Two primary observers will be seated at bubble windows on either side of the aircraft, and a third observer will observe part time and record data the rest of the time. In a change to the original 4MP, Shell will place a fourth observer on the aircraft. That PSO will rest when not at one of the three positions noted here. PSOs will rotate among the four positions so that individual observers do not observe for longer than 2 hrs continuously. All observers will be seated at bubble windows to facilitate downward viewing. The fifth observer will serve as an ice observer and will record data pertinent to Shell's ice observation program. For each marine mammal sighting, the observer will dictate the species, number, size/age/sex class when determinable, activity, heading, swimming speed category (if traveling), sighting cue, ice conditions (type and percentage), and inclinometer reading to the marine mammal into a digital recorder. The inclinometer reading will be taken when the animal's location is 90° to the side of the aircraft track, allowing calculation of lateral distance from the aircraft trackline.

DSLR and video cameras will be operated during all aerial surveys in the Beaufort Sea during 2012 and will collect imagery along the trackline concurrent with observations being made by PSOs. Data collected during these surveys will permit comparisons between data obtained by PSOs vs. those that can be obtained from digital still images and video. The rationale for this component of the study is to validate the ability of the sensors to collect high quality data that will be collected using unmanned aerial surveys (UAS) in the future and to obtain information on possible biases of future UAS-collected data in comparison to manned surveys. The cameras will also provide high resolution information on sea and ice conditions during the survey, which can be used to supplement and validate data recorded by PSOs.

(3) Acoustic Monitoring

Shell will conduct SSV tests to establish the isopleths for the applicable exclusion radii, mostly to be employed during the ZVSP surveys. In addition, Shell will use acoustic recorders to study bowhead deflections.

Drilling Sound Measurements—Drilling sounds are expected to vary significantly with time due to variations in the level of operations and the different types of equipment used at different times onboard the *Kulluk* or *Discoverer.* The objectives of these measurements are to:

(1) Quantify the absolute sound levels produced by drilling and to monitor their variations with time, distance, and direction from the drilling vessel;

(2) Measure the sound levels produced by vessels operating in support of exploration drilling operations. These vessels will include crew change vessels, tugs, icebreakers, and OSRVs; and

(3) Measure the sound levels produced by an end-of-hole ZVSP survey, using a stationary sound source.

The *Kulluk* or *Discoverer,* support vessels, and ZVSP sound measurements will be performed using one of two methods, both of which involve real-time monitoring. Since drafting the original 4MP in 2011, Shell and NMFS have agreed that spectrograms will be calculated daily, and all information will be included in a weekly report that discusses drillship and vessel activities that occurred during the week.

Vessel sound characterizations will be performed using dedicated recorders deployed at sufficient distance from drilling operations so that sound produced by those activities does not interfere. Three AMAR autonomous acoustic recorders will be deployed on and perpendicular to a sail track on which all Shell vessels will transit. The deployment geometry will be as shown in Figure 4 in Shell's April 2012 4MP. This geometry is designed to obtain sound level measurements as a function of distance and direction. The fore and aft directions are sampled continuously over longer distances to 3.1 and 6.2 mi (5 and 10 km) respectively, while broadside and other directions are sampled as the vessels pass closer to the recorders. Additional details can be found in Shell's 4MP.

Acoustic Study of Bowhead Call Distribution—Shell plans to deploy arrays of acoustic recorders in the Beaufort Sea in 2012, similar to that which was done in 2007–2011 using Directional Autonomous Seafloor Acoustic Recorders (DASARs). These directional acoustic systems permit localization of bowhead whale and other marine mammal vocalizations. The purpose of the array will be to further understand, define, and document sound characteristics and propagation resulting from vessel-based exploration drilling operations that may have the potential to cause deflections of bowhead whales from their migratory pathway. Of particular interest will be the east-west extent changes in call distribution, if any. In other words, how far east or west of a sound source can changes in the distribution of calls be detected? Similarly, will the presence of a sound source result in a shift of calling whales offshore or toward shore?

Using passive acoustics with directional autonomous recorders, the locations of calling whales will be observed for a 6- to 10-week continuous monitoring period at five coastal sites (subject to favorable ice and weather conditions). Essential to achieving this objective is the continuous measurement of sound levels near the drillship.

Shell plans to conduct the whale migration monitoring using the passive acoustics techniques developed and used successfully since 2001 for monitoring the migration past Northstar production island northwest of Prudhoe Bay and from Kaktovik to Harrison Bay during the 2007–2011 migrations. Those techniques involve using DASARs to measure the arrival angles of bowhead calls at known locations, then triangulating to locate the calling whale.

In attempting to assess the responses of bowhead whales to the planned industrial operations, it will be essential to monitor whale locations at sites both near and far from industry activities. Shell plans to monitor at five sites along the Alaskan Beaufort coast as shown in Figure 8 of Shell's April 2012 4MP. The sites are the same as used since 2007, but the layout of the DASAR recorders will be somewhat different from previous years in order to improve the ability to detect calls during the drilling operations. The eastern-most site (#5 in Figure 8 of the April 2012 4MP) is just east of Kaktovik (approximately 62 mi [100 km] west of the Sivulliq drilling area) and the western-most site (#1 in Figure 8 of the 4MP) is in the vicinity of Harrison Bay (approximately 112 mi [180 km] west of Sivulliq). Site 2 is located west of Prudhoe Bay (approximately 73 mi [117 km] west of Sivulliq). Site 4 is approximately 10 mi (16 km) east of the Sivulliq drilling area, and site 3 is approximately 20 mi (32 km) west of Sivulliq.

In 2007–2011, each array was comprised of seven DASARs oriented in a north-south pattern so that five equilateral triangles with 4.3-mi (7-km) element spacing was achieved. In 2012, the following changes are planned in the DASAR layout of sites 1 and 4:

- At site 1 the three adjacent DASARs that have detected the most calls in 2007–2011 (1D, 1E, and 1F) will be kept in place to continue collecting data that can be compared with previous years. The remaining four DASARs (1A, 1B, 1C, and 1G) will be moved to site 4. These four low-performance DASAR locations have, on average (2007–2011), detected as little as 1/100th of the calls detected at high-performance locations; and
- At site 4 the four central DASARs (4A, 4C, 4E, and 4G) will be moved to their mirror-image position east of DASARs 4B, 4D, and 4F. This is shown in Figures 8 and 9 of Shell's April 2012 4MP. The main reason for doing this is to improve the ability to detect whale calls by placing these DASARs farther away from the drilling operation, where background sound levels will likely be lower. The four DASARs removed from site 1 will be added to the northern end of site 4 (4J, 4K, 4L, and 4M in Figure 9 in Shell's 4MP). This will improve the detection of calls from whales that choose a more northern route while migrating westward past the drilling operation.

In another change from the original 4MP, a small array of three DASARs with 1.25 mi (2 km) spacing—referred to as a triplet—will be deployed northwest of each drillsite, with the closest DASAR 3.7 mi (6 km) from the drillship. When and if the drillship is moved to another site, the triplet of DASARs will be retrieved and redeployed in the same relative locations. The triplets are shown in Figure 9 of Shell's April 2012 4MP as small brown triangles. Additional details are contained in Shell's April 2012 4MP (see **ADDRESSES**).

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, comprised of experts in the fields of marine mammal ecology and underwater acoustics, to review Shell's 4MP for Exploration Drilling of Selected Lease Areas in the Alaskan Beaufort Sea in 2012. The panel met on January 5–6, 2012, and provided their final report to NMFS on January 27, 2012. The full panel report can be viewed on the Internet at: *http://www.nmfs.noaa.gov/pr/pdfs/permits/openwater/peer_review_report_shell_beaufort.pdf.*

NMFS provided the panel with Shell's 4MP and asked the panel to answer the following questions regarding the plan:

(1) Will the applicant's stated objectives effectively further the understanding of the impacts of their activities on marine mammals and otherwise accomplish the goals stated above? If not, how should the objectives

be modified to better accomplish the goals above?

(2) Can the applicant achieve the stated objectives based on the methods described in the plan?

(3) Are there technical modifications to the proposed monitoring techniques and methodologies proposed by the applicant that should be considered to better accomplish their stated objectives?

(4) Are there techniques not proposed by the applicant (*i.e.,* additional monitoring techniques or methodologies) that should be considered for inclusion in the applicant's monitoring program to better accomplish their stated objectives?

(5) 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 (*i.e.,* 90-day report and comprehensive report)?

Prior to meeting with the panel, Shell reviewed the final reports of the 2010 and 2011 peer review panels, as Shell's 2010 proposed drilling activities were reviewed by the 2010 panel before the program was ultimately cancelled and both reports contained general recommendations. In its presentation to the 2012 panel, Shell discussed suggested modifications and revisions to the 4MP submitted to NMFS in September 2011 and provided to the panel for review. The panel's final report includes recommendations both on the contents of the September 2011 4MP and the modifications presented at the meeting in January 2012.

NMFS has reviewed the report and evaluated all recommendations made by the panel and has determined there are several measures that Shell can incorporate into its 2012 Camden Bay exploratory drilling program 4MP to improve it. The panel recommendations determined by NMFS that are appropriate for inclusion in the 2012 program have been discussed with Shell and are included in the IHA, as appropriate. A summary of the recommendations that have been incorporated into Shell's revised Camden Bay 4MP is provided next.

(1) Vessel-Based Monitoring Measures

- Within safe limits, the PSOs should be stationed where they have the best possible viewing. Viewing may not always be best from the ship bridge, and in some cases may be best from higher positions with less visual obstructions (*e.g.,* flying bridge).
- The PSOs should be instructed to identify animals as unknown where appropriate rather than strive to identify a species if there is significant uncertainty.
- Sampling of the relative near-field around operations must be corrected for effort to provide the best possible estimates of marine mammals in safety and exposure zones.
- The PSOs should maximize their time with eyes on the water. This may require new means of recording data (*e.g.,* audio recorder) or the presence of a data recorder so that the observers can simply relay information to them.
- It would be useful if the PSOs or recorders have GIS software available to plot marine mammals sighted and vessel position on a real-time basis.
- Shell should develop a plan for real-time, inter-vessel communication of animal positions when multiple vessels are operating in an area.
- Continued testing and development to improve marine mammal detection capabilities when sighting conditions are poor is needed (*e.g.,* nighttime, high sea states, inclement weather).
- Apply appropriate statistical procedures for probability estimation of marine mammals missed based on observational data acquired during some period of time before and after night and fog events.
- Panel members made a recommendation regarding independence in the hiring, training, and debriefing of PSOs. In support of that recommendation, NMFS recommends that Shell provide its daily PSO logs to NMFS throughout the operating season.

(2) Acoustic Monitoring

- If a mitigation gun is used during the stationary zero-offset vertical seismic surveys around the drilling sites, a reduced duty cycle (*e.g.,* 1 shot/min) would be appropriate.
- Once source characterization and verification measurements are obtained (including better resolution on directionality, as discussed below), propagation models should be rerun to provide better spatial footprints on which to base mitigation zones.
- Shell should consider the potential integration of visual and acoustic data from the Beaufort and Chukchi Seas monitoring programs and the Joint Science Program to produce estimates of bowhead, beluga, and walrus density using methods developed in the DECAF project by the Center for Research into Ecological and Environmental Modeling (CREEM) at the University of St. Andrews in Scotland.
- The panel supports the rearrangement of the DASARs and addition of targeted triplets around the (changing) location of drilling operations that was presented to the panel on January 5, 2012. This arrangement differs from what is described in the September 2011 monitoring plan.

(3) Aerial Survey Program

- Aerial surveys should maintain line transects and not circle to verify cow/calf pairs.
- Conditions allowing, it is recommended that the direction of flight be determined randomly instead of always flying west-to-east. A randomized approach of where to start flying line transects is suggested.
- In terms of the experimental use of photography and video to augment human observers in aerial surveys, the panel emphasizes the use of similar methods and equipment throughout the season to ensure data consistency and comparability. The panel also recommends that, if the aircraft is able to fly at 1,000 ft (305 m) or below, the surveys always use 20 mm lenses (rather than 100 mm) to ensure an adequate strip width.

(4) Presentation of Data in Reports

- It is important that the required reports are useful summaries and interpretations of the results of the various elements of the monitoring plans as opposed to merely regurgitations of all of the raw results. They should thus represent a first derivative level of summary/interpretation of the efficacy, measurements, and observations rather than raw data or fully processed analysis. A clear summary timeline and spatial (map) representation/summary of operations and important observations should be given. Any and all mitigation measures (*e.g.,* vessel course deviations for animal avoidance, operational shutdown) should be summarized. Additionally, an assessment of the efficacy of monitoring methods should be provided.

Reporting Measures

The Notice of Proposed IHA (76 FR 68974, November 7, 2011) described the reporting requirements that would be required of Shell, including an SSV report, technical reports, a comprehensive report, and reports of sightings of injured or dead marine mammals. Please refer to that notice for the full description. Slight changes have been made to the submission of the SSV report, as described in the response to *Comment 69* earlier in this document. Because of the nature of the sounds that will be produced during Shell's operations, it is more appropriate to have a ''rolling'' schedule of submission

of sound signatures. Additionally, in response to a recommendation from the peer review panel, NMFS will receive the daily PSO sighting logs.

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 drilling program. Noise propagation from the drillship, associated support vessels (including during ice management/icebreaking if needed), and the airgun array are expected to harass, through behavioral disturbance, affected marine mammals species or stocks. Additional disturbance to marine mammals may result from aircraft overflights and visual disturbance of the drillship or support vessels. However, based on the flight paths and altitude, impacts from aircraft operations are anticipated to be localized and minimal in nature.

The full suite of potential impacts to marine mammals from various industrial activities was described in detail in the ''Potential Effects of the Specified Activity on Marine Mammals'' section in the proposed IHA. The potential effects of sound from the exploratory drilling program 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.,* 1995a). NMFS estimates that Shell's activities will most likely result in behavioral disturbance, including avoidance of the ensonified area or changes in speed, direction, and/or diving profile of one or more marine mammals. For reasons discussed in the proposed IHA, hearing impairment (TTS and PTS) is highly unlikely to occur based on the fact that most of the equipment to be used during Shell's drilling program does not have source levels high enough to elicit even mild TTS and/or the fact that certain species are expected to avoid the ensonified areas close to the operations. Additionally, non-auditory physiological effects are anticipated to be minor, if any would occur at all. Finally, based on the required mitigation and monitoring measures described earlier in this document and the fact that the back-propagated source levels for the drillships proposed to be used are estimated to be between 177 and 185 dB re 1 μPa (rms), no injury or mortality of marine mammals is anticipated as a result of Shell's exploratory drilling program.

For continuous sounds, such as those produced by drilling operations and during icebreaking activities, NMFS uses a received level of 120-dB (rms) to indicate the onset of Level B harassment. For impulsive sounds, such as those produced by the airgun array during the ZVSP surveys, NMFS uses a received level of 160-dB (rms) to indicate the onset of Level B harassment. Shell provided calculations for the 120-dB isopleths produced by both the *Kulluk* and the *Discoverer* and by the icebreaker during icebreaking activities and then used those isopleths to estimate takes by harassment. Additionally, Shell provided calculations for the 160-dB isopleth produced by the airgun array and then used that isopleth to estimate takes by harassment. Shell provides a full description of the methodology used to estimate takes by harassment in its IHA application (see **ADDRESSES**), which is also provided in the Notice of Proposed IHA (76 FR 68974, November 7, 2011). Please refer to those documents for the full explanation, as only a short summary is provided here. Additional information on the revised 120-dB isopleth and take estimates from use of the *Kulluk* based on the installation of the quieting technologies is provided here. The method for calculating the take estimates has not changed, merely the extent of the 120-dB isopleth that was used to derive the final take estimates.

Shell requested authorization to take bowhead, gray, and beluga whales, harbor porpoise, and ringed, spotted, bearded, and ribbon seals incidental to exploration drilling, ice management/icebreaking, and ZVSP activities. Additionally, Shell provided exposure estimates and requested takes of narwhal. However, as stated previously in this document, sightings of this species are rare, and the likelihood of occurrence of narwhals in the drilling area is minimal. Therefore, NMFS has not authorized take for narwhals.

Basis for Estimating ''Take by Harassment''

''Take by Harassment'' is described in this section and was calculated in Shell's application by multiplying the expected densities of marine mammals that may occur near the exploratory drilling operations by the area of water likely to be exposed to continuous, non-pulse sounds ≥120 dB re 1 μPa (rms) during drillship operations or icebreaking activities and impulse sounds ≥160 dB re 1 μPa (rms) created by seismic airguns during ZVSP activities. The single exception to this method is for the estimation of exposures of bowhead whales during the fall migration where more detailed data were available, allowing an alternate approach to be used. NMFS evaluated and critiqued the methods provided in Shell's application and determined that they were appropriate.

Marine mammal densities near the operation are likely to vary by season and habitat. However, sufficient published data allowing the estimation of separate densities during summer (July and August) and fall (September and October) are only available for beluga and bowhead whales. As noted above, exposures of bowhead whales during the fall are not calculated using densities. Therefore, summer and fall densities have been estimated for beluga whales, and a summer density has been estimated for bowhead whales. Densities of all other species have been estimated to represent the duration of both seasons.

Marine mammal densities are also likely to vary by habitat type. In the Alaskan Beaufort Sea, where the continental shelf break is relatively close to shore, marine mammal habitat is often defined by water depth. Bowhead and beluga occurrence within nearshore (0–131 ft, 0–40 m), outer continental shelf (131–656 ft, 40–200 m), slope (656–6,562 ft, 200–2000 m), basin (>6,562 ft, 2000 m), or similarly defined habitats have been described previously (Moore *et al.,* 2000; Richardson and Thomson, 2002). The presence of most other species has generally only been described relative to the entire continental shelf zone (0–656 ft, 0–200 m) or beyond. Sounds produced by the drilling vessel and the seismic airguns are expected to drop below 120 dB and 160 dB, respectively, within the nearshore zone (0–131 ft, 0–40 m, water depth) while sounds produced by ice management/icebreaking activities, if they are necessary, are likely to also be present in the outer continental shelf (131–656 ft, 40–200 m).

In addition to water depth, densities of marine mammals are likely to vary with the presence or absence of sea ice. At times during either summer or fall, pack-ice may be present in some of the area around the drilling operation. However, the retreat of sea ice in the

Alaskan Beaufort Sea has been substantial in recent years, so Shell has assumed that only 33% of the area exposed to sounds ≥120 dB or ≥160 dB by the activities will be in ice margin habitat. Therefore, ice-margin densities of marine mammals in both seasons have been multiplied by 33% of the area exposed to sounds by the drilling vessel and ZVSP activities, while open-water (nearshore) densities have been multiplied by the remaining 67% of the area.

To provide some allowance for the uncertainties, ''maximum estimates,'' as well as ''average estimates,'' of the numbers of marine mammals potentially affected have been derived. For a few marine mammal species, several density estimates were available, and in those cases the mean and maximum estimates were determined from the survey data. In other cases, no applicable estimate (or perhaps a single estimate) was available, so correction factors were used to arrive at ''average'' and ''maximum'' estimates. These are described in detail in Shell's application and the proposed IHA. NMFS has determined that the average density data of marine mammal populations will be used to calculate estimated take numbers because these numbers are based on surveys and monitoring of marine mammals in the vicinity of the project area. Table 6–12 in Shell's application indicates that the ''average estimate'' for gray whales, harbor porpoise, and ribbon seal is zero. Therefore, to account for the fact that these species listed as being potentially taken by harassment in this document may occur in Shell's drilling sites during active operations, NMFS either used the ''maximum estimates'' or made an estimate based on typical group size for a particular species.

Detectability bias, quantified in part by *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 along the survey trackline. Some sources of densities used here 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 data (*e.g.,* Moore *et al.,* 2000).

Estimated Area Exposed to Sounds >120 dB or >160 dB re 1 μPa rms

(1) Estimated Area Exposed to Continuous Sounds ≥120 dB rms from the Drillship

Shell proposes that exploration drilling in Camden Bay would be conducted from either the *Kulluk* or the *Discoverer* but not both. As mentioned earlier in this document, the *Kulluk* is the primary vessel to be used for drilling operations in Camden Bay. The *Discoverer* would only be used if the primary vessel is unavailable for any reason. The two vessels are likely to introduce somewhat different levels of sound into the water during exploration drilling activities. Descriptions of the expected source levels and propagation distances from the two vessels are provided in this section. These distances and associated ensonified areas are then used in the following section to calculate separate estimates of potential exposures.

Sounds from the *Kulluk* were measured in the Beaufort Sea in 1986 and reported by Greene (1987a). The back propagated broadband source level from the measurements (185.5 dB re 1 μPa · rms; calculated from the reported 1/3-octave band levels), which included sounds from a support vessel operating nearby, were used to model sound propagation at the Sivulliq prospect near Camden Bay. However, as mentioned earlier in this document, the *Kulluk* has been retrofitted with two technologies intended to quiet the vessel. Based on the installation of those technologies, Shell recommends and NMFS' acoustic experts agree that a 5 dB reduction of modeled noise source is a reasonable estimate of the effectiveness of the quieting technologies being implemented. Using a 5 dB reduction, the model estimates that sounds would decrease to 120 dB rms at approximately 5.2 mi (8.4 km) from the *Kulluk* (Hannay and Ireland, 2012; see Table 2 here). As a precautionary approach, Shell multiplied that distance by 1.5, and the resulting radius of 7.8 mi (12.6 km) was used to estimate the total area that may be exposed to continuous sounds ≥120 dB re 1 μPa rms by the *Kulluk* at each drill site. Assuming one well site will be drilled in each season (summer and fall), the total area of water ensonified to ≥120 dB rms in each season would be 191 mi^2 (499 km^2). The revised 120-dB isopleth estimates are considerably lower than previously identified in the Notice of Proposed IHA (76 FR 68974, November 7, 2011) (*i.e.,* 8.2 mi [13.27 km] and 12.3 mi [19.91 km] with the 1.5 factor).

TABLE 2—SOUND PROPAGATION MODELING RESULTS OF EXPLORATION DRILLING, ICEBREAKING, AND ZVSP ACTIVITIES NEAR CAMDEN BAY IN THE ALASKAN BEAUFORT SEA

Source	Received level (dB re 1 μPa)	Modeling results (km)	Used in calculations (km)
Kulluk	120	8.4	12.6
Discoverer	120	3.32	4.98
Icebreaking	120	7.63	9.5
ZVSP	160	3.67	5.51

Sounds from the *Discoverer* have not previously been measured in the Arctic. However, measurements of sounds produced by the *Discoverer* were made in the South China Sea in 2009 (Austin and Warner, 2010). The results of those measurements were used to model the sound propagation from the *Discoverer* (including a nearby support vessel) at planned exploration drilling locations in the Chukchi and Beaufort seas (Warner and Hannay, 2011). Broadband source levels of sounds produced by the *Discoverer* varied by activity and direction from the ship but were generally between 177 and 185 dB re 1 μPa · m rms (Austin and Warner, 2010). Propagation modeling at the Sivulliq and Torpedo prospects yielded somewhat different results, with sounds expected to propagate shorter distances at the Sivulliq site (Warner and Hannay, 2011). As a precautionary approach, Shell used the larger distance to which sounds ≥120 dB (2.06 mi [3.32 km]) are expected to propagate at the Torpedo site to estimate the area of water potentially exposed at both locations. The estimated (2.06 mi [3.32 km]) distance was multiplied by 1.5 (= 3.09 mi [4.98 km]) as a further precautionary measure before calculating the total area that may be exposed to continuous

sounds ≥120 dB re 1 μPa rms by the *Discoverer* at each drill site (see Table 6–3 in Shell's application). Assuming one well would be drilled in each season (summer and fall), the total area of water ensonified to ≥120 dB rms in each season would be 30 mi^2 (78 km^2). The 160-dB radii for the *Kulluk* and the *Discoverer* were estimated to be approximately 180 ft (55 m) and 33 ft (10 m), respectively. Again, because source levels for the two drillships were measured to be between 177 and 185 dB, the 180 and 190-dB radii were not needed.

The acoustic propagation model used to estimate the sound propagation from both vessels in Camden Bay is JASCO's Marine Operations Noise Model (MONM). MONM computes received sound levels in rms units when source levels are specified also in those units. MONM treats sound propagation in range-varying acoustic environments through a wide-angled parabolic equation solution to the acoustic wave equation. The specific parabolic equation code in MONM is based on the Naval Research Laboratory's Range-dependent Acoustic Model. This code has been extensively benchmarked for accuracy and is widely employed in the underwater acoustics community (Collins, 1993).

For analysis of the potential effects on migrating bowhead whales Shell calculated the total distance perpendicular to the east-west migration corridor ensonified to ≥120 dB rms in order to determine the number of migrating whales passing the activities that might be exposed to that sound level. For the *Kulluk,* that distance is 2 × 7.8 mi (12.6 km) (the estimated radius of the 120 dB rms zone), or 15.6 mi (25.2 km) (*i.e.* 7.8 mi [12.6 km] north and 7.8 mi [12.6 km] south of the drill site); for the *Discoverer,* that distance is 2 × 3.09 mi, or 6.19 mi, (4.98 km or 9.96 km). At the two Sivulliq sites (G and N, which are located close together and positioned similarly relative to the 131 and 656 ft [40 and 200 m] bathymetric contours), the 15.6 mi (25.2 km) distance from the *Kulluk* covers all of the 23 mi (37 km) wide 0–131 ft (0–40 m) water depth category, and approximately 11% of the 22.1 mi (35.5 km) wide 131–656 ft (40–200 m) water depth category. The 9.96 km distance from the *Discoverer* covers 27% of the 0–131 ft (0–40 m) category and none of the 131–656 ft (40–200 m) category at the Sivulliq sites.

The two drill sites on the Torpedo prospect (designated as H and J) are not as close together as the Sivulliq sites, but their position relative to the 131 ft (40 m) and 656 ft (200 m) bathymetric contours are similar. For simplicity, Shell provided and used only the slightly greater estimates resulting from calculations at the Torpedo ''H'' site to represent activities at either of the two Torpedo sites. At the Torpedo ''H'' site, the 15.6 mi (25.2 km) distance from the *Kulluk* covers approximately 74% of the 37 km wide 0–131 ft (0–40 m) water depth category and approximately 35% of the 22.1 mi (35.5 km) wide 131–656 ft (40–200 m) water depth category. The 6.19 mi (9.96 km) distance from the *Discoverer* covers 27% of the 0–131 ft (0–40 m) category and none of the 131–656 ft (40–200 m) category at either of the Torpedo sites.

The percentages of water depth categories described in the previous two paragraphs were multiplied by the estimated proportion of the whales passing within those categories on each day to estimate the number of bowheads that may be exposed to sounds ≥120 dB if they showed no avoidance of the exploration drilling operations.

(2) Estimated Area Exposed to Continuous Sounds >120 dB rms From Ice Management/Icebreaking Activities

Measurements of the icebreaking supply ship *Robert Lemeur* pushing and breaking ice during exploration drilling operations in the Beaufort Sea in 1986 resulted in an estimated broadband source level of 193 dB re 1 μPa · m (Greene, 1987a; Richardson *et al.,* 1995a). Measurements of the icebreaking sounds were made at five different distances and those were used to generate a propagation loss equation [$RL = 141.4 - 1.65R - 10Log(R)$ where R is range in kilometers (Greene, 1987a); converting R to meters results in the following equation: $R = 171.4 - 10log(R) - 0.00165R$]. Using that equation, the estimated distance to the 120 dB threshold for continuous sounds from icebreaking is 4.74 mi (7.63 km). Since the measurements of the *Robert Lemeur* were taken in the Beaufort Sea under presumably similar conditions as would be encountered in 2012, an inflation factor of 1.25 was selected to arrive at a precautionary 120 dB distance of 5.9 mi (9.5 km) for icebreaking sounds (see Table 6–3 in Shell's application).

If ice is present, ice management/icebreaking activities may be necessary in early July and towards the end of operations in late October, but it is not expected to be needed throughout the proposed exploration drilling season. Icebreaking activities would likely occur in a 40° arc up to 3.1 mi (5 km) upwind of the *Kulluk* or *Discoverer* (see Figure 1–3 and Attachment B in Shell's application for additional details). This activity area plus a 5.9 mi (9.5 km) buffer around it results in an estimated total area of 162 mi^2 (420 km2) that may be exposed to sounds ≥120 dB from ice management/icebreaking activities in each season. Icebreaking is not expected to occur during the bowhead migration since it is only anticipated to be needed either in early July or late October, so additional take estimates during the migration period have not been calculated.

(3) Estimated Area Exposed to Impulsive Sounds ≥160 dB rms From Airguns

Shell proposes to use the ITAGA eight-airgun array for the ZVSP surveys in 2012, which consists of four 150-in^3 airguns and four 40-in^3 airguns for a total discharge volume of 760 in^3. The ≥160 dB re 1 μPa rms radius for this source was estimated from measurements of a similar seismic source used during the 2008 BP Liberty seismic survey (Aerts *et al.,* 2008). The BP liberty source was also an eight-airgun array but had a slightly larger total volume of 880 in^3. Because the number of airguns is the same, and the difference in total volume only results in an estimated 0.4 dB decrease in the source level of the ZVSP source, the 100th percentile propagation model from the measurements of the BP Liberty source is almost directly applicable. However, the BP Liberty source was towed at a depth of 5.9 ft (1.8 m), while Shell's ZVSP source would be lowered to a target depth of 13 ft (4 m) (from 10–23 ft [3–7 m]). The deeper depth of the ZVSP source has the potential to increase the source strength by as much as 6 dB. Thus, the constant term in the propagation equation from the BP Liberty source was increased from 235.4 to 241.4 while the remainder of the equation ($-18 * LogR - 0.0047 * R$) was left unchanged. NMFS reviewed the use of this equation and the similarities between the 2008 BP Liberty project and Shell's proposed drilling sites and determined that it is appropriate to base the sound isopleths on those results. This equation results in the following estimated distances to maximum received levels: 190 dB = 0.33 mi (524 m); 180 dB = 0.77 mi (1,240 m); 160 dB = 2.28 mi (3,670 m); 120 dB = 6.52 mi (10,500 m). The ≥160 dB distance was multiplied by 1.5 (see Table 6–3 in Shell's application) for use in estimating the area ensonified to ≥160 dB rms around the drilling vessel during ZVSP activities. Therefore, the total area of water potentially exposed to received sound levels ≥160 dB rms by ZVSP operations at one exploration well site during each season (*i.e.,* summer and

fall) is estimated to be 73.7 mi² (190.8 km²).

For analysis of potential effects on migrating bowhead whales, the ≥120 dB distance for exploration drilling activities was used on all days during the bowhead migration as described previously. This is a precautionary approach in the case of the *Kulluk* since the ≥160 dB zone for the relatively brief ZVSP surveys is expected to be less than the ≥120 dB distance from the *Kulluk.* If the *Discoverer* were to be used, the slightly greater distance to the ≥160 dB threshold from the ZVSP airguns than the ≥120 dB distance from the *Discoverer* (see Table 6–3 in Shell's application) would result in only 3% more of the 0–131 ft (0–40 m) depth category being ensonified on up to 2 days. This would result in an estimated increase of approximately 10 bowhead whales compared to the estimates shown in (see Table 6–7 in Shell's application).

Shell intends to conduct sound propagation measurements on the *Kulluk* or *Discoverer* (whichever is used) and the airgun source in 2012 once they are on location near Camden Bay. The results of those measurements would then be used during the season to implement mitigation measures.

Potential Number of ''Takes by Harassment''

Although a marine mammal may be exposed to drilling or icebreaking sounds ≥120 dB (rms) or airgun sounds ≥160 dB (rms), 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. There are several variables that determine whether or not an individual animal will exhibit a response to the sound, such as the age of the animal, previous exposure to this type of anthropogenic sound, habituation, etc.

Numbers of marine mammals that might be present and potentially disturbed (*i.e.,* Level B harassment) are estimated below based on available data about mammal distribution and densities at different locations and times of the year as described previously. Exposure estimates have been calculated based on the use of either the *Kulluk* or *Discoverer* operating in Camden Bay beginning in July, as well as ice management/icebreaking activities, if needed, and minimal airgun usage (see estimates below). Shell will not conduct any activities associated with the exploration drilling program in Camden Bay during the 2012 Kaktovik and Nuiqsut (Cross Island) fall bowhead whale subsistence harvests. Shell will suspend exploration activities on August 25, prior to the beginning of the hunts, will resume activities in Camden Bay after conclusion of the subsistence harvests, and complete exploration activities on or about October 31, 2012. Actual drilling may occur on approximately 78 days in Camden Bay (which includes the 20–28 hours total needed for airgun operations), approximately half of which would occur before and after the fall bowhead subsistence hunts.

The number of different individuals of each species potentially exposed to received levels of continuous sound ≥120 dB re 1 μPa (rms) or to pulsed sounds ≥160 dB re 1 μPa (rms) within each season and habitat zone was estimated by multiplying:

- The anticipated area to be ensonified to the specified level in the time period and habitat zone to which a density applies, by
- The expected species density.

The estimate for bowhead whales during the migration period was calculated differently as described previously. The numbers of exposures were then summed for each species across the seasons and habitat zones.

At times during either summer (July–August) or fall (September–October), pack-ice may be present in some of the area around the exploration drilling operation. However, the retreat of sea ice in the Alaskan Beaufort Sea has been substantial in recent years, so Shell assumed that only 33% of the area exposed to sounds ≥120 dB or ≥160 dB by the exploration drilling program and ZVSP activities will be in ice-margin habitat. Therefore, ice-margin densities of marine mammals in both seasons have been multiplied by 33% of the area exposed to sounds by the drilling and ZVSP activities, while open-water (nearshore) densities have been multiplied by the remaining 67% of the area. Since any icebreaking activities would only occur in ice-margin habitat, the entire area exposed to sounds ≥120 dB from icebreaking was multiplied by the ice-margin densities.

Estimates from use of the *Discoverer* and during ice management/icebreaking and the ZVSP surveys are the same as in the Notice of Proposed IHA (76 FR 68974, November 7, 2011). Only estimates from use of the *Kulluk* have changed since publication of that notice. The change is based on an estimated 5 dB reduction in the sound level of the *Kulluk* with the installation of the new quieting technologies, which were described previously in this document. Revised take estimate tables are provided here for use of the *Kulluk* (see Tables 3 and 4).

TABLE 3—ESTIMATES OF THE NUMBER OF BELUGA AND BOWHEAD WHALES IN AREAS WHERE MAXIMUM RECEIVED SOUND LEVELS IN THE WATER WOULD BE ≥120 dB FROM OPERATIONS CONDUCTED BY THE KULLUK DURING SHELL'S PROPOSED EXPLORATION DRILLING PROGRAM IN SUMMER (JULY–AUGUST) AND FALL (SEPTEMBER–OCTOBER) NEAR CAMDEN BAY IN THE BEAUFORT SEA, ALASKA, 2012

Season: Species	Number of individuals exposed to sound levels ≥120 dB from *Kulluk*					
	Nearshore		Ice margin		Total	
	Avg.	Max.	Avg.	Max.	Avg.	Max.
Summer:						
Beluga	1	4	0	2	1	6
Bowhead	6	24	3	12	9	35
Fall:						
Beluga	1	5	1	5	2	9
Bowhead	3,483	6,966	N/A	N/A	3,483	6,966

TABLE 4—ESTIMATES OF THE NUMBERS OF MARINE MAMMALS (EXCLUDING BELUGA AND BOWHEAD WHALES) IN EACH OFFSHORE AREA WHERE MAXIMUM RECEIVED SOUND LEVELS IN THE WATER WOULD BE ≥120 dB FROM THE KULLUK DURING SHELL'S PROPOSED EXPLORATION DRILLING PROGRAM NEAR CAMDEN BAY IN THE BEAUFORT SEA, ALASKA, 2012

Species	Number of individuals exposed to sound levels ≥120 dB from *Kulluk*					
	Nearshore		Ice margin		Total	
	Avg.	Max.	Avg.	Max.	Avg.	Max.
Harbor porpoise	0	0	0	0	0	5
Gray whale	0	0	0	0	0	5
Bearded seal	12	48	4	17	16	65
Ribbon seal	0	0	0	0	0	5
Ringed seal	235	939	82	327	317	1,267
Spotted seal	2	10	0	0	2	10

Estimated Take Conclusions

As stated previously, NMFS' practice has been to apply the 120 dB re 1 μPa (rms) received level threshold for underwater continuous sound levels and the 160 dB re 1 μPa (rms) received level threshold for underwater impulsive sound levels to determine whether take by Level B harassment occurs. However, not all animals react to sounds at these low levels, and many will not show strong reactions (and in some cases any reaction) until sounds are much stronger.

Although the 120-dB isopleth for the drillships may seem fairly expansive (*i.e.,* 7.8 mi [12.6 km] for the *Kulluk* or 4.6 mi [7.4 km] for the *Discoverer,* which include the 50 percent inflation factor), the zone of ensonification begins to shrink dramatically with each 10-dB increase in received sound level. The 160-dB rms zones for the *Kulluk* and *Discoverer* are estimated to extend approximately 180 ft (55 m) and 33 ft (10 m) from the ship, respectively. As stated previously, source levels for the two different drillships are expected to be between 177 and 185 dB (rms). For an animal to be exposed to received levels between 177 and 185 dB, it would have to be within several meters of the vessel, which is unlikely, especially given the fact that certain species are likely to avoid the area.

For impulsive sounds, such as those produced by the airguns, studies reveal that baleen whales show avoidance responses, which would reduce the likelihood of them being exposed to higher received sound levels. The 180-dB zone (0.77 mi [1.24 km]) is one-third the size of the 160-dB zone (2.28 mi [3.67 km], which is the modeled distance before the 1.5 inflation factor is included). In the limited studies that have been conducted on pinniped responses to pulsed sound sources, they seem to be more tolerant and do not exhibit strong behavioral reactions (see Southall *et al.,* 2007).

NMFS is authorizing the average take estimates provided in Shell's application and Table 5 here for bowhead whales and bearded, ringed, and spotted seals. The only exceptions to this are for the gray whale, harbor porpoise, and ribbon seal since the average estimate is zero for those species and for the beluga whale to account for group size. Therefore, for the 2012 Beaufort Sea drilling season, NMFS has authorized the take of 65 beluga whales, 3,502 bowhead whales, 15 gray whales, 15 harbor porpoise, 30 bearded seals, 588 ringed seals, 7 spotted seals, and 5 ribbon seals. For beluga and gray whales and harbor porpoise, this represents 0.2% of the Beaufort Sea population of approximately 39,258 beluga whales (Allen and Angliss, 2011), 0.08% of the Eastern North Pacific stock of approximately 18,017 gray whales (Allen and Angliss, 2011), and 0.03% of the Bering Sea stock of approximately 48,215 harbor porpoise (Allen and Angliss, 2011). This represents 23% of the BCB bowhead population of 15,232 individuals assuming 3.4% annual population growth from the 2001 estimate of 10,545 animals (Zeh and Punt, 2005). The take estimates presented for bearded, ringed, and spotted seals represent 0.01%, 0.2%, and 0.01% of the Bering-Chukchi-Beaufort populations for each species, respectively. The take estimate for ribbon seals represents 0.01% of the Alaska stock of this species. These take numbers are based on Shell utilizing the *Kulluk.* Table 5 here also presents the take numbers and percentages of the population if Shell utilizes the *Discoverer* instead, which has a smaller 120-dB radius. If the *Discoverer* is used for drilling operations instead of the *Kulluk,* the take estimates for bowhead whales and ringed and bearded seals drop substantially.

With the exception of the subsistence mitigation measure of shutting down during the Nuiqsut and Kaktovik fall bowhead whale hunts, these take estimates do not take into account any of the mitigation measures described previously in this document. Additionally, if the fall bowhead hunts end after September 15, and Shell still concludes activities on October 31, then fewer animals will be exposed to drilling sounds, especially bowhead whales, as more of them will have migrated past the area in which they would be exposed to continuous sound levels of 120 dB or greater or impulsive sound levels of 160 dB or greater prior to Shell resuming active operations. These take numbers also do not consider how many of the exposed animals may *actually* respond or react to the exploration drilling program. Instead, the take estimates are based on the presence of animals, regardless of whether or not they react or respond to the activities.

TABLE 5—POPULATION ABUNDANCE ESTIMATES, TOTAL AUTHORIZED LEVEL B TAKE (WHEN COMBINING TAKES FROM DRILLSHIP OPERATIONS, ICE MANAGEMENT/ICEBREAKING, AND ZVSP SURVEYS) FOR THE KULLUK AND DISCOVERER, AND PERCENTAGE OF POPULATION THAT MAY BE TAKEN FOR THE POTENTIALLY AFFECTED SPECIES, DEPENDENT UPON WHICH DRILLSHIP IS USED

Species	Abundance [1]	Total authorized level B take with the *Kulluk* [2]	Percentage of stock or population	Total authorized level B take with the *Discoverer* [3]	Percentage of stock or population
Bowhead Whale	[4] 15,232	3,502	23	1,398	9.2
Gray Whale	18,017	15	0.08	15	0.08
Beluga Whale	39,258	65	0.2	37	0.1
Harbor Porpoise	48,215	15	0.03	15	0.03
Ringed Seal	249,000	588	0.2	320	0.1
Bearded Seal	250,000	30	0.01	17	0.01
Spotted Seal	59,214	7	0.01	7	0.01
Ribbon Seal	49,000	5	0.01	5	0.01

[1] Abundance estimates taken from Allen and Angliss (2011) unless otherwise stated.
[2] This includes take from operation of the *Kulluk,* ice management/icebreaking, and the airguns.
[3] This includes take from operation of the *Discoverer,* ice management/icebreaking, and the airguns.
[4] Estimate from George *et al.* (2004) with an annual growth rate of 3.4%.

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 Shell's Camden Bay exploratory drilling program, and none are authorized. Injury, serious injury, or mortality could occur if there were a large or very large oil spill. However, as discussed previously in this document, the likelihood of a spill is extremely remote. Shell has implemented many design and operational standards to minimize the potential for an oil spill of any size. NMFS has not authorized take from an oil spill, as it is not part of the specified activity. Additionally, animals in the area are not expected to incur hearing impairment (*i.e.,* TTS or PTS) or non-auditory physiological effects. Instead, any impact that could result from Shell's activities is most likely to be behavioral harassment and is expected to be of limited duration. Although it is possible that some individuals may be exposed to sounds from drilling operations more than once, during the migratory periods it is less likely that this will occur since animals will continue to move westward across the Beaufort Sea. This is especially true for bowhead whales that will be migrating past the drilling operations beginning in mid- to late September (depending on the date Shell resumes activities after the shutdown period for the fall bowhead subsistence hunts by the villages of Kaktovik and Nuiqsut).

Some studies have shown that bowhead whales will continue to feed in areas of seismic operations (*e.g.,* Richardson, 2004). Therefore, it is possible that some bowheads may continue to feed in an area of active drilling operations. It is important to note that the sounds produced by drilling operations are of a much lower intensity than those produced by seismic airguns. Should bowheads choose to feed in the ensonified area instead of avoiding the sound, individuals may be exposed to sounds at or above 120 dB (rms) for several hours to days, depending on how long the individual animal chooses to remain in the area to feed. Should bowheads choose to feed in Camden Bay during the ZVSP surveys, this activity will occur only twice during the entire drilling season and will not last more than 10–14 hours each time. It is anticipated that one such survey would occur prior to the migration period and one during the migration period. Therefore, feeding or migrating bowhead whales would only be exposed to airgun sounds for a total of 10–14 hours throughout the entire open-water season. Many animals perform vital functions, such as feeding, resting, traveling, and socializing on a diel cycle (24-hr cycle). As discussed here, some bowhead whales may decide to remain in Camden Bay for several days to feed; however, they are not expected to be feeding for 24 hours straight each day. Additionally, if an animal is excluded from Camden Bay for feeding because it decides to avoid the ensonified area, this may result in some extra energy expenditure for the animal to find an alternate feeding ground. However, as noted in the response to *Comment 14,* Camden Bay is only one of several feeding areas for bowhead whales in the U.S. Arctic Ocean. NMFS anticipates that bowhead whales could find feeding opportunities in other parts of the Beaufort Sea.

The sounds produced by the drillship are of lower intensity than those produced by seismic airguns. Therefore, if animals remain in ensonified areas to feed, they would be in areas where the sound levels are not high enough to cause injury (based on the fact that source levels are not expected to reach levels known to cause even slight, mild TTS, a non-injurious threshold shift). Additionally, if bowhead whales come within the 180-dB (rms) radius when the airguns are operational, Shell will shutdown the airguns until the animals are outside of the required exclusion zone. Although the impact resulting from the generation of sound may cause a disruption in feeding activities in and around Camden Bay, this disruption is not reasonably likely to adversely affect rates of recruitment and survival of the BCB bowhead whale population.

Shell's exploration drilling program is not expected to negatively affect the bowhead whale westward migration through the U.S. Beaufort Sea. The migration typically starts around the last week of August or first week of September. Shell will cease operations on August 25 for the fall bowhead whale

hunts at Kaktovik and Cross Island (for the village of Nuiqsut). Operations will not resume until both communities have announced the close of the fall hunt, which typically occurs around September 15 each year. Therefore, whales that migrate through the area the first few weeks of the migration period will not be exposed to any acoustic or non-acoustic stimuli from Shell's operations. Only the last 6 weeks of Shell's operations would occur during the migratory period. Cow/calf pairs typically migrate through the area later in the season (*i.e.,* late September/October) as opposed to the beginning of the season (*i.e.,* late August/early September). Shell's activities are not anticipated to have a negative effect on the migration or on the cow/calf pairs migrating through the area. If cow/calf pairs migrate through during airgun operations, required power down and shutdown procedures would reduce impacts further.

Beluga whales are more likely to occur in the project area after the recommencement of activities in September than in July or August. Should any belugas occur in the area of active drilling, it is not expected that they would remain in the area for a prolonged period of time, as their westward migration usually occurs further offshore (more than 37 mi [60 km]) and in deeper waters (more than 656 ft [200 m]) than that planned for the location of Shell's Camden Bay well sites. Gray whales do not occur frequently in the Camden Bay area of the Beaufort Sea. Additionally, there are no known feeding grounds for gray whales in the Camden Bay area. The most northern feeding sites known for this species are located in the Chukchi Sea near Hanna Shoal and Point Barrow. Based on these factors, exposures of gray whales to industrial sound are not expected to last for prolonged periods (*i.e.,* several days or weeks) since they are not known to remain in the area for extended periods of time. Since harbor porpoise are considered extralimital in the area with recent sightings not occurring east of Prudhoe Bay, no adverse impacts that could affect important life functions are anticipated for this species.

Some individual pinnipeds may be exposed to drilling sounds more than once during the time frame of the project. This may be especially true for ringed seals, which occur in the Beaufort Sea year-round and are the most frequently encountered pinniped species in the area. However, as stated previously, pinnipeds appear to be more tolerant of anthropogenic sound, especially at lower received levels, than other marine mammals, such as mysticetes.

Ringed seals construct lairs for pupping in the Beaufort Sea. However, this species typically does not construct lairs until late winter/early spring on the landfast ice. Because Shell will cease operations by October 31, they will not be in the area during the ringed seal pupping season. Bearded seals breed in the Bering and Chukchi Seas, as the Beaufort Sea provides less suitable habitat for the species. Spotted and ribbon seals are even less common in the Camden Bay area. These species do not breed in the Beaufort Sea. Shell's exploration drilling program is not anticipated to impact breeding or pupping for any of the ice seal species.

Of the eight marine mammal species likely to occur in the drilling area, only the bowhead whale is listed as endangered under the ESA. The species is also designated as ''depleted'' under the MMPA. Despite these designations, the BCB stock of bowheads has been increasing at a rate of 3.4% annually for nearly a decade (Allen and Angliss, 2011), even in the face of ongoing industrial activity. 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, 2011). Certain stocks or populations of gray and beluga whales and spotted seals are listed as endangered or are proposed for listing under the ESA; however, none of those stocks or populations occur in the activity area. On December 10, 2010, NMFS published a notice of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notice 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 of these two ice seal species is currently considered depleted under the MMPA. There is currently no established critical habitat in the project area for any of these eight species.

Potential impacts to marine mammal habitat were discussed in detail in the Notice of Proposed IHA (76 FR 68974, November 7, 2011; see the ''Anticipated Effects on Habitat'' section). Although some disturbance is possible to food sources of marine mammals, any impacts to affected marine mammal stocks or species are anticipated to be minor. Based on the vast size of the Arctic Ocean where feeding by marine mammals occurs versus the localized area of the drilling program, any missed feeding opportunities in the direct project area would be of little consequence, as marine mammals would have access to other feeding grounds.

If the *Kulluk* is the drillship used, the estimated takes proposed to be authorized represent 0.2% of the Beaufort Sea population of approximately 39,258 beluga whales (Allen and Angliss, 2011), 0.08% of the Eastern North Pacific stock of approximately 18,017 gray whales (Allen and Angliss, 2011), 0.03% of the Bering Sea stock of approximately 48,215 harbor porpoise (Allen and Angliss, 2011), and 23% of the Bering-Chukchi-Beaufort population of 15,232 individuals assuming 3.4% annual population growth from the 2001 estimate of 10,545 animals (Zeh and Punt, 2005). The take estimates presented for bearded, ringed, and spotted seals represent 0.01%, 0.2%, and 0.01% of the Bering-Chukchi-Beaufort populations for each species, respectively. The take estimate for ribbon seals represents 0.01% of the Alaska stock of this species. If the *Discoverer* is the drillship used, the estimated takes proposed to be authorized represent 0.1% of the Beaufort Sea population of approximately 39,258 beluga whales (Allen and Angliss, 2011), 0.08% of the Eastern North Pacific stock of approximately 18,017 gray whales (Allen and Angliss, 2011), 0.03% of the Bering Sea stock of approximately 48,215 harbor porpoise (Allen and Angliss, 2011), and 9.2% of the Bering-Chukchi-Beaufort population of 15,232 individuals assuming 3.4% annual population growth from the 2001 estimate of 10,545 animals (Zeh and Punt, 2005). The take estimates presented for bearded, ringed, and spotted seals represent 0.01%, 0.1%, and 0.01% of the Bering-Chukchi-Beaufort populations for each species, respectively. The take estimate for ribbon seals represents 0.01% of the Alaska stock of this species. 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.

The estimated take numbers are likely an overestimate for several reasons. First, these take numbers were calculated using a 50% inflation factor of the 120-dB and 160-dB radii, which is a precautionary approach recommended by some acousticians when modeling a new sound source in a new location. SSV tests could reveal that the Level B harassment zone is either smaller or larger than that used to estimate take. If the SSV tests reveal that the Level B harassment zones are

slightly larger than those modeled, the 50% inflation factor should cover the discrepancy; however, based on recent SSV tests of seismic airguns (which showed that the measured 160-dB isopleths was in the area of the modeled value), the 50% correction factor likely results in an overestimate of takes. Additionally, the mitigation and monitoring measures (described previously in this document) included in the IHA are expected to reduce even further any potential disturbance to marine mammals. Last, some marine mammal individuals, including mysticetes, have been shown to avoid the ensonified area around airguns at certain distances (Richardson *et al.,* 1999), and, therefore, some individuals would not likely enter into the Level B harassment zones for the various types of activities.

The take estimates for the *Kulluk* are approximately 2.5 times those for the *Discoverer.* One explanation for this is that the *Kulluk's* original rigid structure does little to dampen vibration as it moves through the structure to the hull. This past year, Shell has invested in retrofitting the *Kulluk.* As described earlier in this document, this retrofit includes changing out the engines and installing sound dampening mounts for the new engines. This retrofit is expected to help lower the sound levels emitted by the *Kulluk.* As stated previously, Shell intends to conduct SSV tests for all vessels, including the drillship, once on location in the Beaufort Sea in 2012. Therefore, there is the potential that fewer animals will be taken than previously estimated if the SSV tests indicate smaller isopleths. Based on the best available information, the mitigation and monitoring protocols that will be implemented by Shell, and the extremely low likelihood of a major oil spill occurring, NMFS has determined that Shell's activities would have no more than a negligible impact on the affected marine mammal species and 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 drilling activities are the principal concerns related to subsistence use of the area. Subsistence remains the basis for Alaska Native culture and community. Marine mammals are legally hunted in Alaskan waters by coastal Alaska Natives. In rural Alaska, subsistence activities are often central to many aspects of human existence, including patterns of family life, artistic expression, and community religious and celebratory activities. Additionally, the animals taken for subsistence provide a significant portion of the food that will last the community throughout the year. The main species that are hunted include bowhead and beluga whales, ringed, spotted, and bearded seals, walruses, and polar bears. (As mentioned previously in this document, 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.

The subsistence communities in the Beaufort Sea that have the potential to be impacted by Shell's Camden Bay drilling program include Kaktovik, Nuiqsut, and Barrow. Kaktovik is a coastal community 60 mi (96.6 km) east of the project area. Nuiqsut is 118 mi (190 km) west of the project area and about 20 mi (32 km) inland from the coast along the Colville River. Cross Island, from which Nuiqsut hunters base their bowhead whaling activities, is 47 mi (75.6 km) southwest of the project area. Barrow, the community farthest from the project area, lies 298 mi (479.6 km) west of Shell's Camden Bay drill sites.

(1) Bowhead Whales

Of the three communities, Barrow is the only one that currently participates in a spring bowhead whale hunt. However, this hunt is not anticipated to be affected by Shell's activities, as the spring hunt occurs in late April to early May, and Shell's Camden Bay drilling program will not begin prior to July 1.

All three communities participate in a fall bowhead hunt. In autumn, westward-migrating bowhead whales typically reach the Kaktovik and Cross Island (Nuiqsut hunters) areas by early September, at which point the hunts begin (Kaleak, 1996; Long, 1996; Galginaitis and Koski, 2002; Galginaitis and Funk, 2004, 2005; Koski *et al.,* 2005). Around late August, the hunters from Nuiqsut establish camps on Cross Island from where they undertake the fall bowhead whale hunt. The hunting period starts normally in early September and may last as late as mid-October, depending mainly on ice and weather conditions and the success of the hunt. Most of the hunt occurs offshore in waters east, north, and northwest of Cross Island where bowheads migrate and not inside the barrier islands (Galginaitis, 2007). Hunters prefer to take bowheads close to shore to avoid a long tow, but Braund and Moorehead (1995) report that crews may (rarely) pursue whales as far as 50 mi (80 km) offshore. Whaling crews use Kaktovik as their home base, leaving the village and returning on a daily basis. The core whaling area is within 12 mi (19.3 km) of the village with a periphery ranging about 8 mi (13 km) farther, if necessary. The extreme limits of the Kaktovik whaling grounds would be the middle of Camden Bay to the west. The timing of the Kaktovik bowhead whale hunt roughly parallels the Cross Island whale hunt (Impact Assessment Inc., 1990b; SRB&A, 2009:Map 64). In recent years, the hunts at Kaktovik and Cross Island have usually ended by mid-to-late-September.

Westbound bowheads typically reach the Barrow area in mid-September and are in that area until late October (Brower, 1996). However, over the years, local residents report having seen a small number of bowhead whales feeding off Barrow or in the pack ice off Barrow during the summer. Recently, autumn bowhead whaling near Barrow has normally begun in mid-September to early October, but in earlier years it began as early as August if whales were observed and ice conditions were favorable (USDI/BLM, 2005). The recent decision to delay harvesting whales until mid-to-late September has been made to prevent spoilage, which might occur if whales were harvested earlier in the season when the temperatures tend to be warmer. Whaling near Barrow can continue into October, depending on the quota and conditions.

Shell anticipates arriving on location in Camden Bay around July 10 and continuing operations until August 25. Shell will suspend all operations on August 25 for the Nuiqsut (Cross Island) and Kaktovik subsistence bowhead whale hunts. The drillship and support vessels will leave the Camden Bay project area, will move to a location at or north of 71.25° N. latitude and at or west of 146.4° W. longitude, and will return to resume activities after the Nuiqsut (Cross Island) and Kaktovik bowhead hunts conclude. Depending on when Nuiqsut and Kaktovik declare their hunts closed, drilling operations may resume in the middle of the Barrow fall bowhead hunt.

(2) Beluga Whales

Beluga whales are not a prevailing subsistence resource in the communities of Kaktovik and Nuiqsut. Kaktovik hunters may harvest one beluga whale in conjunction with the bowhead hunt; however, it appears that most households obtain beluga through exchanges with other communities. Although Nuiqsut hunters have not hunted belugas for many years while on

Cross Island for the fall hunt, this does not mean that they may not return to this practice in the future. Data presented by Braund and Kruse (2009) indicate that only 1% of Barrow's total harvest between 1962 and 1982 was of beluga whales and that it did not account for any of the harvested animals between 1987 and 1989.

There has been minimal harvest of beluga whales in Beaufort Sea villages in recent years. Additionally, if belugas are harvested, it is usually in conjunction with the fall bowhead harvest. Shell will not be operating during the Kaktovik and Nuiqsut fall bowhead harvests.

(3) Ice Seals

Ringed seals are available to subsistence users in the Beaufort Sea year-round, but they are primarily hunted in the winter or spring due to the rich availability of other mammals in the summer. Bearded seals are primarily hunted during July in the Beaufort Sea; however, in 2007, bearded seals were harvested in the months of August and September at the mouth of the Colville River Delta. An annual bearded seal harvest occurs in the vicinity of Thetis Island (which is a considerable distance from Shell's Camden Bay drill sites) in July through August. Approximately 20 bearded seals are harvested annually through this hunt. Spotted seals are harvested by some of the villages in the summer months. Nuiqsut hunters typically hunt spotted seals in the nearshore waters off the Colville River delta, which is more than 100 mi (161 km) from Shell's drill sites.

Although there is the potential for some of the Beaufort villages to hunt ice seals during the summer and fall months while Shell is conducting exploratory drilling operations, the primary sealing months occur outside of Shell's operating time frame. Additionally, some of the more established seal hunts that do occur in the Beaufort Sea, such as the Colville delta area hunts, are located a significant distance (in some instances 100 mi [161 km] or more) from the project area.

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 Shell's drilling program 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) 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. Helicopter activity also has the potential to disturb cetaceans and pinnipeds by causing them to vacate the area. Additionally, general vessel presence in the vicinity of traditional hunting areas could negatively impact a hunt. 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.

In the case of subsistence hunts for bowhead whales in the Beaufort 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 the unlikely event of an oil spill, marine mammals could become contaminated and therefore unavailable to subsistence users. Additionally, perception could also affect availability of marine mammals for subsistence uses. Even if whales or seals are not oiled or contaminated by an oil spill, the mere perception that they could be contaminated could reduce the availability of marine mammals for subsistence uses.

Plan of Cooperation (POC)

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. Shell developed a POC for its 2012 Camden Bay, Beaufort Sea, Alaska, exploration drilling program to minimize any adverse impacts on the availability of marine mammals for subsistence uses. A copy of the Draft POC was provided to NMFS with the IHA Application as Attachment D (see **ADDRESSES** for availability). Meetings with potentially affected subsistence users began in 2009 and continued into 2010 and 2011 (see Table 4.2–1 in Shell's POC for a list of all meetings conducted through April 2011). During these meetings, Shell focused on lessons learned from prior years' activities and presented mitigation measures for avoiding potential conflicts, which are outlined in the 2012 POC and this document. For the 2012 Camden Bay drilling program, Shell's POC with Chukchi Sea villages primarily addresses the issue of transit of vessels, whereas the POC with Beaufort Sea villages addresses vessel transit, drilling, and associated activities. Communities that were consulted regarding Shell's 2012 Arctic Ocean operations include: Barrow, Kaktovik, Wainwright, Kotzebue, Kivalina, Point Lay, Point Hope, Kiana, Gambell, Savoonga, and Shishmaref.

Beginning in early January 2009 and continuing into 2011, Shell held one-on-one meetings with representatives from the North Slope Borough (NSB) and Northwest Arctic Borough (NWAB), subsistence-user group leadership, and Village Whaling Captain Association representatives. Shell's primary purpose in holding individual meetings was to inform and prepare key leaders, prior to the public meetings, so that they would be prepared to give appropriate feedback on planned activities.

Shell presented the proposed project to the NWAB Assembly on January 27, 2009, to the NSB Assembly on February 2, 2009, and to the NSB and NWAB Planning Commissions in a joint meeting on March 25, 2009. Meetings were also scheduled with representatives from the AEWC, and presentations on proposed activities were given to ICAS, and the Native Village of Barrow. On December 8, 2009, Shell held consultation meetings with representatives from the various marine mammal commissions. Prior to drilling in 2012, Shell will also hold additional consultation meetings with the affected communities and subsistence user groups, NSB, and NWAB to discuss the mitigation measures included in the POC. Shell presented information regarding the proposed operations and marine mammal monitoring plans at the 2012 Arctic Open Water Meeting in Anchorage, Alaska, which was held

March 6–8, 2012. Shell also attended the 2011 CAA negotiation meetings in support of a limited program of marine environmental baseline activities in 2011 taking place in the Beaufort and Chukchi seas. Shell has stated that it is committed to a CAA process and will demonstrate this by making a good-faith effort to negotiate a CAA every year it has planned activities. To that end, Shell attended the 2012 CAA negotiation meetings and signed the 2012 CAA on March 26, 2012.

The following mitigation measures, plans and programs, are integral to the POC and were developed during consultation with potentially affected subsistence groups and communities. These measures, plans, and programs will be implemented by Shell during its 2012 exploration drilling operations in both the Beaufort and Chukchi Seas to monitor and mitigate potential impacts to subsistence users and resources. The mitigation measures Shell has adopted and will implement during its 2012 Camden Bay exploration drilling operations are listed and discussed below. The most recent version of Shell's planned mitigation measures was presented to community leaders and subsistence user groups starting in January of 2009 and has evolved since in response to information learned during the consultation process.

To minimize any cultural or resource impacts to subsistence whaling activities from its exploration operations, Shell will suspend drilling activities on August 25, 2012, prior to the start of the Kaktovik and Cross Island bowhead whale hunting season. The drillship and associated vessels will remain outside of the Camden Bay area during the hunt. Shell will resume drilling operations after the conclusion of the hunt and, depending on ice and weather conditions, continue its exploration activities through October 31, 2012. In addition to the adoption of this project timing restriction, Shell will implement the following additional measures to ensure coordination of its activities with local subsistence users to minimize further the risk of impacting marine mammals and interfering with the subsistence hunts for marine mammals:

(1) The drillship and support vessels will transit through the Chukchi Sea along a route that lies offshore of the polynya zone. In the event the transit outside of the polynya zone results in Shell having to break ice (as opposed to managing ice by pushing it out of the way), the drillship and support vessels will enter into the polynya zone far enough so that ice breaking is not necessary. If it is necessary to move into the polynya zone, Shell will notify the local communities of the change in the transit route through the Com Centers;

(2) Shell has developed a Communication Plan and will implement the plan before initiating exploration drilling operations to coordinate activities with local subsistence users as well as Village Whaling Associations in order to minimize the risk of interfering with subsistence hunting activities and keep current as to the timing and status of the bowhead whale migration, as well as the timing and status of other subsistence hunts. The Communication Plan includes procedures for coordination with Com and Call Centers to be located in coastal villages along the Chukchi and Beaufort Seas during Shell's proposed activities in 2012;

(3) Shell will employ local Subsistence Advisors from the Beaufort and Chukchi Sea villages to provide consultation and guidance regarding the whale migration and subsistence hunt. There will be a total of nine subsistence advisor-liaison positions (one per village), to work approximately 8-hours per day and 40-hour weeks through Shell's 2012 exploration project. The subsistence advisor will use local knowledge (Traditional Knowledge) to gather data on subsistence lifestyle within the community and advise on ways to minimize and mitigate potential impacts to subsistence resources during the drilling season. Responsibilities include reporting any subsistence concerns or conflicts; coordinating with subsistence users; reporting subsistence-related comments, concerns, and information; and advising how to avoid subsistence conflicts. A subsistence advisor handbook will be developed prior to the operational season to specify position work tasks in more detail;

(4) Shell will implement flight restrictions prohibiting aircraft from flying within 1,000 ft (305 m) of marine mammals or below 1,500 ft (457 m) altitude (except during takeoffs and landings or in emergency situations) while over land or sea;

(5) The drilling support fleet will avoid known fragile ecosystems, including the Ledyard Bay Critical Habitat Unit and will include coordination through the Com Centers;

(6) All vessels will maintain cruising speed not to exceed 9 knots while transiting the Beaufort Sea;

(7) Collect all drilling mud and cuttings with adhered mud from all well sections below the 26-inch (20-inch casing) section, as well as treated sanitary waste water, domestic wastes, bilge water, and ballast water and transport them outside the Arctic for proper disposal in an Environmental Protection Agency licensed treatment/disposal site. These waste streams shall not be discharged into the ocean;

(8) Drilling mud shall be cooled to mitigate any potential permafrost thawing or thermal dissociation of any methane hydrates encountered during exploration drilling if such materials are present at the drill site; and

(9) Drilling mud shall be recycled to the extent practicable based on operational considerations (*e.g.,* whether mud properties have deteriorated to the point where they cannot be used further) so that the volume of the mud disposed of at the end of the drilling season is reduced.

The POC also contains measures regarding ice management procedures, critical operations procedures, the blowout prevention program, and oil spill response. Some of the oil spill response measures to reduce impacts to subsistence hunts include: Having the primary OSRV on standby at all times so that it is available within 1 hour if needed; the remainder of the OSR fleet will be available within 72 hours if needed and will be capable of collecting oil on the water up to the calculated Worst Case Discharge; oil spill containment equipment will be available in the unlikely event of a blowout; capping stack equipment will be stored aboard one of the ice management vessels and will be available for immediate deployment in the unlikely event of a blowout; and pre-booming will be required for all fuel transfers between vessels.

Unmitigable Adverse Impact Analysis and Determination

Shell has adopted a spatial and temporal strategy for its Camden Bay operations that should minimize impacts to subsistence hunters. First, Shell's activities will not commence until after the spring hunts have occurred. Additionally, Shell will traverse the Chukchi Sea far offshore, so as to not interfere with July hunts in the Chukchi Sea and will communicate with the Com Centers to notify local communities of any changes in the transit route. Once Shell is on location in Camden Bay, Beaufort Sea, whaling will not commence until late August/early September. Shell has agreed to cease operations on August 25 to allow the villages of Kaktovik and Nuiqsut to prepare for the fall bowhead hunts, will move the drillship and all support vessels out of the hunting area so that there are no physical barriers between the marine mammals and the hunters, and will not recommence activities until

the close of both villages' hunts. The location has been agreed to by both Shell and the AEWC so as not to interfere with preparations for hunting at Barrow.

Kaktovik is located 60 mi (96.6 km) east of the project area. Therefore, westward migrating whales would reach Kaktovik before reaching the area of Shell's activities or any of the ensonified zones. Although Cross Island and Barrow are west of Shell's drill sites, sound generating activities from Shell's drilling program will have ceased prior to the whales passing through the area. Additionally, Barrow lies 298 mi (479.6 km) west of Shell's Camden Bay drill sites, so whalers in that area would not be displaced by any of Shell's activities.

Adverse impacts are not anticipated on sealing activities since the majority of hunts for seals occur in the winter and spring, when Shell will not be operating. Sealing activities in the Colville River delta area occur more than 100 mi (161 km) from Shell's Camden Bay drill sites.

Shell will also support the village Com Centers in the Arctic communities and employ local SAs from the Beaufort and Chukchi Sea villages to provide consultation and guidance regarding the whale migration and subsistence hunt. The SAs will provide advice to Shell on ways to minimize and mitigate potential impacts to subsistence resources during the drilling season.

In the unlikely event of a major oil spill in the Beaufort Sea, there could be major impacts on the availability of marine mammals for subsistence uses (such as displacement from traditional hunting grounds and contaminated animals taken for harvests). However, as discussed earlier in this document, the probability of a major oil spill occurring over the life of the project is low (Bercha, 2008). As a condition of the 2012 CAA that Shell signed on March 26, 2012, any company engaged in drilling operations agrees to enter into a binding oil spill mitigation agreement with the AEWC, NSB, and ICAS to provide for hunter transport to alternate hunting locations in the unlikely event of an oil spill. Additionally, Shell developed an OSRP, which was recently approved by BSEE after review and comment by DOI and several Federal agencies and the public. Shell has also incorporated several mitigation measures into its operational design to reduce further the risk of an oil spill. Based on the information available, the mitigation measures that Shell will implement, and the extremely low likelihood of a major oil spill occurring, NMFS has determined that Shell's activities will not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses.

Endangered Species Act (ESA)

There is one marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the project area: The bowhead whale. There are two marine mammal species proposed for listing as threatened with confirmed or possible occurrence in the project area: Ringed and bearded seals. NMFS' Permits and Conservation Division conducted consultation with NMFS' Endangered Species Division under section 7 of the ESA on the issuance of an IHA to Shell under section 101(a)(5)(D) of the MMPA for this activity. In April, 2012, NMFS finished conducting its section 7 consultation and issued a Biological Opinion, and concluded that the issuance of the IHA associated with Shell's 2012 Beaufort Sea drilling program is not likely to jeopardize the continued existence of the endangered bowhead whale, the Arctic sub-species of ringed seal, or the Beringia distinct population segment of bearded seal. No critical habitat has been designated for these species, therefore none will be affected.

National Environmental Policy Act (NEPA)

NMFS prepared an EA that includes an analysis of potential environmental effects associated with NMFS' issuance of an IHA to Shell to take marine mammals incidental to conducting an exploratory drilling program in Camden Bay, Beaufort Sea, Alaska. NMFS has finalized the EA and prepared a FONSI for this action. Therefore, preparation of an Environmental Impact Statement is not necessary. NMFS' EA was available to the public for a 30-day comment period before it was finalized.

Authorization

As a result of these determinations, NMFS has issued an IHA to Shell for the take of marine mammals, by Level B harassment, incidental to conducting an offshore exploratory drilling program in Camden Bay in the Beaufort Sea during the 2012 open-water season, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: May 2, 2012.

Helen M. Golde,

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

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