Alaska Eskimo Whaling Commission
P.O. Box 570 • Barrow, Alaska 99723
(907) 852-2392 • Fax: (907) 852-2303 • Toll Free: 1-800-478-2392

December 7, 2011

VIA ELECTRONIC MAIL TO ITP.Nachman@noaaa.gov

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

Re: Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to an Exploration Drilling Program in the Chukchi Sea, Alaska (76 Fed. Reg. 69958 (November 9, 2011)

Dear Mr Payne:

Thank you for the opportunity to comment on the application of Shell Offshore, Inc. (Shell) to the National Marine Fisheries Service (NMFS) for an Incidental Harassment Authorization (IHA) pursuant to the Marine Mammal Protection Act (MMPA) for oil and gas related activities in the Chukchi Sea. *See* 76 Fed. Reg. 69958 (November 9, 2011). These comments are submitted on behalf of the Alaska Eskimo Whaling Commission ("AEWC"). The AEWC represents the eleven bowhead whale subsistence hunting villages of Barrow, Nuiqsut, Kaktovik, Pt. Hope, Pt. Lay, Wainwright, Kivalina, Wales, Savoonga, Gambell, and Little Diomede.

The AEWC was formed by the whaling captains of our constituent villages in 1980 for the purpose of protecting our bowhead whale resource and subsistence hunt. We carry out responsibilities through locally delegated tribal authority and through federal authority delegated pursuant to the NOAA-AEWC cooperative agreement. Alaskan Native subsistence takes of marine mammals are exempt from the Marine Mammal Protection Act's (MMPA) moratorium on the take of marine mammals. 16 U.S.C. § 1371(b)(1). In addition, Congress has given our subsistence livelihood priority over other uses of the marine environment, requiring that other users mitigate the impacts of any activities with the potential to adversely affect the availability of our subsistence resource. 16 U.S.C. §§ 1371(b), (a)(5)(A)(i)(I), (a)(5)(D)(i)(II).

Each year the AEWC devotes considerable resources toward negotiating a Conflict Avoidance Agreement (CAA) with oil and gas companies to mitigate the adverse impacts of oil and gas exploration on our subsistence hunt for the bowhead whale. The bowhead whale subsistence hunt is the most important subsistence activity carried out by our communities, and through the subsistence hunt we provide irreplaceable food for our communities and continue our ancient traditions and culture. The CAA process has proved to be essential in striking the important balance between the protection of existing, subsistence-based uses of the Arctic and the more recent interest in the energy resources of the Outer Continental Shelf. The CAA process provides the means for the whaling captains to agree on how OCS activities should be conducted in order to protect the bowhead whale and its habitat for the benefit of our communities, who have been in the Arctic since time immemorial.

Without careful management and the input of the local whaling captains and their traditional knowledge, OCS activities threaten to disrupt our subsistence hunts, potentially pollute the pristine Arctic waters from which we harvest our subsistence food, and interfere with the bowhead whale migration. Our whaling captains have expressed concerns about direct impacts to the subsistence hunt resulting from deflection of bowhead whales by vessel traffic and underwater noise. They also have expressed concerns about direct impacts to bowhead whales from icebreaking, vessel traffic, and geophysical exploration. Direct and indirect threats to our hunting and our whales arise from discharge and associated impacts to water quality, the threats posed by the risk of an oil spill, and the cumulative impacts from the sum of all commercial and industrial activities occurring in our waters.

In 2011, AEWC and Shell were able to reach agreement on a CAA, which included specific mitigation measures designed to protect our subsistence hunting activities from adverse impacts associated with offshore oil and gas exploration work. We commend Shell on its continued involvement with our local community, recognizing the central role that the local whaling captains must play in order to protect existing subsistence uses given the increasing presence of industrial activity in the OCS waters. We have attached the 2011 CAA to our comments.

AEWC regularly holds its meeting on the annual CAA each February, and at that time the whaling captains will come together, discuss proposals and agree on a set of mitigation measures designed to protect the subsistence hunt and the bowhead whales. Because that meeting has not yet happened, we do not know, at this time, whether AEWC and Shell will reach agreement on a CAA for 2012. We will provide that information to NMFS as soon as it becomes available.

Again, we appreciate the efforts that Shell has made to date and are hopeful that potential concerns relating to vessel traffic and the possibility of interference with subsistence activities in the Chukchi and Bering Sea communities will be addressed through the CAA Process. However, we note that factual information included in the

Federal Register notice as well as the proposed finding (or lack thereof) on impacts to subsistence uses appear to be inadequate. We encourage NMFS to correct these deficiencies and will encourage Shell to work with the AEWC and our whaling captains to do the same.

I. NMFS Must Revise Its Discussion and Publish its Proposed Rationale on Whether Shell's Activities May Have an Unmitigable Adverse Impact on the Fall Bowhead Whale Subsistence Hunt in Chukchi Sea Communities.

As we have now stated many times, the subsistence practices of our whaling captains and their communities are adapting to changing climatic and ice conditions. With a warming Arctic, spring ice conditions have become much more dangerous for our whaling crews. To feed their families, they are now conducting fall hunts in Wainright, Pt. Hope, and Pt. Lay. Wainright has landed a whale during the fall hunt for each of the past two years.

Despite our best efforts to communicate this information to NMFS in recent years, the factual information contained in the Federal Register notice is incorrect. In particular, NMFS states that "[f]all bowhead whaling has not typically occurred in the villages of Wainright, Point Hope, and Point Lay in recent years." 76 Fed. Reg. at 70002. NMFS then states that "there is a potential for these villages to resume a fall bowhead harvest." *Id.*

To be clear, fall bowhead whaling has *already resumed* in Wainright, Point Hope, and Point Lay. These communities have been allocated a quota that they may use for the fall hunt by AEWC, and Wainright has now landed a whale in each of the past two fall seasons. We ask that NMFS correct the information in the Federal Register notice and carry forward this information into all future analyses.

Moreover, NMFS has not published for public comment its proposed finding on adverse impacts to the fall bowhead whale hunt in the Chukchi Sea communities. Under the heading "Unmitigable Adverse Impacts Analysis," NMFS includes the following statements:

In recent years, bowhead whales have occasionally been taken in the fall by coastal villages along the Chukchi coast, but the total number of these animals has been small. Wainright landed its first fall whale in more than 90 years in October 2010. Hunters from the northwest Arctic villages prefer to harvest whales within 50 mi. (80 km) so as to avoid long tows back to shore.

76 Fed. Reg. at 70004.

The above text does not include any proposed finding from NMFS on whether Shell's proposed activities may have an unmitigable adverse impact on the fall hunt in

Chukchi Sea villages. As we have stated many times in the past, the traditional knowledge of our whaling captains, born out by western science research, tells us that bowhead whales are very sensitive to noise from vessel traffic and will become skittish or otherwise more difficult and dangerous to hunt around vessels such as those associated with Shell's proposed activities. We are particularly concerned about Shell's support vessels, oil spill tanker and other resupply vessels, which would be traveling to Wainright as shown at Figure 13.e-1 in Shell's Exploration Plan. We are also concerned about the possible transit route for Shell's drillship and support vessels, which could potentially overlap with the fall hunt for Pt. Hope and Pt. Lay. We therefore request that NMFS acknowledge our fall hunting activities and then publish its proposed findings related to unmitigable adverse impacts so that our whaling captains can review and comment on those draft conclusions. As we have stated in the past, the analysis should consider the specific location and timing of subsistence hunting for each community as compared to the specific timing and location of Shell's proposed operations, including vessel transit, staging of the oil spill tanker and other support vessels, support vessel traffic back and forth between the drilling vessel and Wainright or any other shore bases, and aircraft routes.

II. NMFS Must Include a Discussion of Potential Impacts to Bering Sea Communities from Transit of the Drillship and Fleet of Support Vessel Through the Bering Sea.

Our whaling captains have also expressed concern about the potential impacts to hunting activities in Bering Sea communities resulting from vessel traffic through the area after the end of the proposed drilling operations. In the past, they have requested that Shell terminate operations and begin transit out of the Chukchi Sea by October 31st of each year. The proposed Incidental Harassment Authorization clarifies that it is only valid from July 4, 2012 through October 31, 2012. 76 Fed. Reg. at 70004. We believe that this is adequate, at this time, to prevent any conflicts with Bering Sea communities so long as Shell begins transit towards the Bering Strait on October 31st.

We request that NMFS specifically identify this issue in all future Federal Register notices regarding IHAs for oil and gas activities in the Arctic. NMFS must be considering the potential impacts to Bering Sea communities resulting from vessel traffic that could potentially overlap with subsistence activities. Shell should have plans in place to communicate with those communities if, for whatever reason, its ships are delayed in leaving the Chukchi Sea.

III. NMFS Appears to Underestimate the Potential Impacts to Bowhead Whales by Relying on Density Estimates Instead of Assessing the Number of Migrating Whales that Could be Exposed to Industrial Underwater Noise.

In the Federal Register notice, NMFS estimates that a maximum of 37 bowhead whales could be exposed to sounds levels greater than or equal to 120dB rms during ice management or ice breaking activities. 76 Fed. Reg. at 69998. The total proposed take is 53 bowhead whales. *Id.* at 70000. NMFS estimates that sound could propagate as far as 9.50 km from the sounds source. *Id.* at 69995.

Based on our review of the available materials, combined with the statements made by NMFS in the Beaufort Sea IHA Federal Register notice, we question NMFS's methodology for estimating the number of bowhead whales to be harassed by underwater noise in the Chukchi Sea. The estimates in the Federal Register notice appear to be unreasonably low, and we therefore question whether they are based upon the "best available scientific evidence" as required by 50 C.F.R. § 216.104(b)(3).

In particular, in the Chukchi Sea, NMFS approved Shell's approach of:

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 drill ship operations or icebreaking activities . . . .

76 Fed. Reg. at 69995.

With respect to the Beaufort Sea IHA, however, NMFS did not adopt this approach.

During the fall migration, most bowhead whales will be migrating west past the exploration drilling program, so it is less accurate to assume that the number of individuals present in the area from one day to the next will be static.

76 Fed. Reg. 68974, 69009 (November 7, 2011).

Instead of using a static density estimate, Shell and NMFS considered the "number of whales passing each day," and then daily estimates of exposure to noise were combined to "estimate the total number of bowhead whales that might be exposed" to particular sound levels. *Id.*

NMFS has no reasonable scientific basis to assume in using density estimates that bowhead whales are not migrating through the Chukchi Sea in the fall. Indeed, this basic fact has been well understood for decades, as during this time period bowhead whales are moving across the Chukchi towards their wintering grounds in the Bering Sea. Moreover, we now have much more specific information on migratory habitat in the Chukchi based on the BOEM funded work of Quakenbush et al, who have been working with our whaling captains and the North Slope Borough Department of Wildlife

Management to conduct bowhead whale tagging studies.[1] Contrary to all available scientific information and our traditional knowledge, by using a simple density estimate, NMFS assumes incorrectly that the same bowhead whales will be in the area of the drilling activities throughout the fall seasons. This approach cannot possibly adhere to the best available scientific evidence standard of 50 C.F.R. § 216.104(b)(3).

We ask that NMFS explicitly discuss why it using a static approach in the Chukchi Sea when NMFS has rejected such an approach in the Beaufort Sea, and how this approach complies with the best available scientific evidence standard, especially in light of published information from Quakenbush et al regarding bowhead migration. NMFS should consider whether it can identify the diameter of the ensonified area at an angle perpendicular to the migration and thereby asses, using information from Quakenbush's studies, the total number of bowhead whales that may reasonably be expected to migrate across that line during the fall migration.

IV. In the Upcoming Environmental Assessment, NMFS Must Conduct a Thorough Analysis of Direct, Indirect and Cumulative Impacts to Bowhead Whales, Their Habitat, and Our Subsistence Activities.

Finally, as a part of the upcoming Environmental Assessment, we strongly encourage NMFS to give close consideration to the direct, indirect and cumulative impacts to the bowhead whale, its habitat and our subsistence activities. While the Federal Register notice provides information on direct and potentially some indirect effects, it lacks any discussion of cumulative impacts. Given Shell's proposal to drill in both the Beaufort and Chukchi Seas over multiple years, we remain concerned about the cumulative impacts to bowhead whales. If, for example, 11,150 whales are excluded from feeding opportunities in the Beaufort Sea (as NMFS found in the Federal Register notice for the Beaufort IHA application) and then encounter another drilling operation in the Chukchi Sea, what will be the combined impact to the whales, including mothers and calves, during their migration? While one drill site in the Beaufort Sea may not seem significant in isolation, when combined with operations of Shell, ConocoPhillips, Statoil and others in the Chukchi Sea over multiple years, a greater risk to bowhead whales may exist. We are asking that NMFS develop a method for assessing the total combined impact to bowhead whales from multiple drilling operations in both seas over several years. That analysis should also consider reasonably foreseeable operations in Canadian and Russian waters as well. Moreover, NMFS should take into consideration these other drilling operations when determining whether the harassment proposed by Shell complies with the statutory "negligible impacts" standard. We continue to believe it is arbitrary for NMFS to analyze each proposal in isolation when it knows full well that a number of oil

[1] ADF&G, *et al.* Satellite Tracking of Western Arctic Bowhead Whales (July 2010) (DOI/BOEMRE is listed as the funding agency); Quakenbush, *et al.* Fall and Winter Movements of Bowhead Whales in the Chukchi Sea (2009).

companies are seeking permission to operate concurrently over multiple years in both seas.

Moreover, we are concerned about the potential cumulative impacts to our subsistence activities if Shell transits vessels back and forth between the Chukchi Sea and Beaufort Sea drill sites. We ask that NMFS specify whether and to what extent vessel traffic between the two locations is predicted, and what impact that may have on the subsistence hunt in Barrow. We also ask that NMFS consider whether this vessel traffic may, for instance, combine with deflection from the Camden Bay drill sites to create a larger impact on the bowhead whale migration.

Thank you again for the opportunity to provide comments on the proposed IHA and the Federal Register Notice. Please do not hesitate to contact me if you have any questions regarding this information.

Sincerely,

Johnny L. Aiken
Executive Director

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF THE COMMISSIONER

SEAN PARNELL, GOVERNOR

550 WEST 7TH AVENUE, SUITE 1400
ANCHORAGE, ALASKA 99501-3650
PHONE: (907) 269-8431
FAX: (907) 269-8918

December 8, 2011

Michael Payne, Chief
Permits, Conservation and Education Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

Dear Mr. Payne,

The State of Alaska has reviewed the Application for an Incidental Harassment Authorization (IHA) for exploration in the Chukchi Sea proposed by Shell Offshore Inc. (Shell). Notice of the application and the proposed authorization from the National Marine Fisheries Service (NMFS) was published in the November 9, 2011 issue of the *Federal Register*.

Shell has made a very substantial investment in time and money to obtain authorizations to conduct exploration in the Chukchi Sea (as well as the Beaufort Sea). As reported on the front page of a recent Anchorage Daily News article, a Shell contractor is nearing completion of a $200 million U.S.-made icebreaker that Shell intends to employ in support of its Arctic Outer Continental Shelf (OCS) exploration.

Alaska's Arctic OCS is the state's and country's best hope for stemming the declining throughput in the Trans Alaska Pipeline System (TAPS). Minerals Management Service 2006 estimates for the Arctic OCS range from 410 million (P95) to 23 billion (P05) barrels of oil with a mean of 27.6 TCF.

In its application for IHA, Shell provides extensive detail on the proposed conduct of its exploration activities, the marine mammals that might be impacted and mitigation measures to reduce impacts to those species and to subsistence. Those mitigation measures include temporary suspension of activities to avoid interference with whale hunting; speed restrictions; consultation with subsistence advisors; and many other operational procedures designed to minimize negative impacts on marine mammals.

The State supports NMFS's proposal to issue a Level B harassment only IHA to Shell for its proposed Arctic OCS exploration activities and urges NMFS to complete its decision making process as soon as possible.

The State urges NMFS to issue the final IHA to Apache without delay, in order to allow planned 3D seismic operations to proceed on schedule this fall.

Sincerely,

FOR

Daniel S. Sullivan
Commissioner, Department of Natural Resources

cc: Joseph Balash, Deputy Commissioner, Department of Natural Resources
Ed Fogels, Deputy Commissioner, Department of Natural Resources
Thomas Crafford, Director DNR, Office of Project Management and Permitting
Sara Longan, Large Project Manager, Office of Project Management and Permitting
William Barron, Director DNR, Division of Oil and Gas
Jonne Slemons, Deputy Director, Division of Oil and Gas

ALASKA WILDERNESS LEAGUE—AUDUBON ALASKA
CENTER FOR BIOLOGICAL DIVERSITY—DEFENDERS OF WILDLIFE
EARTHJUSTICE—NATURAL RESOURCES DEFENSE COUNCIL
NORTHERN ALASKA ENVIRONMENTAL CENTER—OCEAN CONSERVANCY
OCEANA—PACIFIC ENVIRONMENT—RESISTING ENVIRONMENTAL DESTRUCTION ON INDIGENOUS LANDS (REDOIL)—SIERRA CLUB
THE WILDERNESS SOCIETY—WORLD WILDLIFE FUND

Dec. 9, 2011

VIA EMAIL

Michael Payne, Chief
Permits, Conservation, and Education Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Re: Taking Marine Mammals Incidental to an Exploration Drilling Program in the Chukchi Sea, Alaska, 76 Fed. Reg. 69,958 (Nov. 9, 2011).

Dear Mr. Payne:

The undersigned groups submit the following comments on the National Marine Fisheries Service's (NMFS) November 9, 2011, issuance of a proposed incidental harassment authorization (IHA) pursuant to the Marine Mammal Protection Act (MMPA). NMFS proposes to allow the incidental take of eight marine mammal species resulting from Shell Gulf of Mexico Inc.'s exploration drilling activities in the Chukchi Sea that are scheduled to begin in July 2012. NMFS should deny Shell's application.

Shell's exploration plan is one portion of the largest Arctic Ocean drilling proposal ever contemplated. Shell intends to conduct simultaneous drilling in the Chukchi and Beaufort seas over multiple years using separate drilling units and accompanying vessel and aircraft fleets. Yet nowhere is the need for better science, oversight, and planning more evident than the Arctic. There is a recognized dearth of necessary data about the marine environment of the Chukchi Sea and a complete lack of demonstrated response and rescue capability. NMFS has repeatedly warned in the past that the lack of information about the Chukchi Sea hinders the agency's ability to meet its MMPA obligations, and the United States Geological Survey's (USGS) recent report has further reinforced the need for additional studies in order to adequately evaluate the potential impacts from offshore industrial activities.

Even based on the information that does exist, the impacts of the proposed exploration drilling on marine mammals, including bowhead, gray, and beluga whales, harbor porpoises, and ice seals, exceed the protective standards imposed by the MMPA. The proposed IHA does not meet the regulatory prohibition on the issuance of an authorization that creates even the

"potential" for the death of, or serious injury to, a marine mammal. The proposal also does not fully assess the effects of the noise and disturbance that would be produced by Shell's activities and does not adequately consider appropriate noise thresholds for potential harassment. Nor does the proposed IHA include sufficient mitigation to reduce impacts to the "least practicable." Each of these points is discussed in more detail below.

I. MARINE MAMMAL PROTECTION ACT

The proposed authorization for Shell's exploration drilling does not comply with the requirements of the MMPA. Congress enacted the MMPA in 1972 in response to widespread concern that "certain species and population stocks of marine mammals are, or may be, in danger of extinction or depletion as a result of man's activities[.]"[1] The legislative history states that the purpose of the MMPA is to manage marine mammals "for their benefit and not for the benefit of commercial exploitation."[2] The primary mechanism by which the MMPA protects marine mammals is through a moratorium on takings.[3] Under the MMPA, the term "take" is broadly defined to mean "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal."[4] "Harassment" is further defined to include acts of "torment" or "annoyance" that have the "potential" to injure a marine mammal or marine mammal stock in the wild or have the potential to "disturb" them "by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."[5]

The MMPA provides several narrow exceptions to the moratorium on take. Relevant here, NMFS may, upon request, authorize take in the form of harassment by an IHA for a period of not more than one year, provided certain conditions are met. An activity: (i) must be "specified" and limited to a "specific geographical region," (ii) must result in the incidental take of only "small numbers of marine mammals of a species or population stock," (iii) can have no more than a "negligible impact" on species and stocks, and (iv) cannot have "an unmitigatable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives.[6] In issuing an authorization, NMFS must provide for the monitoring and reporting of such takings and must prescribe methods and means of effecting the "least practicable impact" on the species or stock and its habitat.[7] Finally, an activity in the Arctic cannot have the "potential to result in serious injury or mortality[.]"[8]

A. Missing Information

In determining whether to approve Shell's request, NMFS must first consider the extent of missing information as to both the environmental baseline in the Arctic and marine mammal

[1] 16 U.S.C. § 1361(1).
[2] H. Rep. No. 92-707 at 11 (1971), reprinted in 1972 U.S.C.C.A.N., pp. 4144, 4154.
[3] 16 U.S.C. § 1371(a).
[4] *Id.* §1362(13).
[5] *Id.* § 1362(18); *see also* 50 C.F.R. § 216.3 (defining "Level A" and "Level B" harassment).
[6] *See* 16 U.S.C. § 1371(a)(5)(D)(i).
[7] *Id.* § 1371(a)(5)(D)(ii)(I).
[8] 50 C.F.R. § 216.107(a).

responses to noise. Both counsel in favor of extreme caution in implementing NMFS's statutory responsibilities.[9]

NMFS itself has recognized that data "to describe marine mammals and their habitat" in the Arctic "are lacking or inadequate to support impact assessment and mitigation planning."[10] Moreover, there "are gaps in our understanding of the biological significance of exposure to various levels of both continuous and impulsive oil and gas activity sounds."[11] These same observations have been echoed by others.[12] Most recently, the USGS found that baseline data for many marine mammal species in the Arctic are still needed, including information on current abundance, seasonal distribution, movements, population dynamics, foraging areas, sea-ice habitat relationships, and age-specific vital rates.[13] The need for this baseline information is apparent even for bowhead whales, one of the better studied species in the Arctic.[14] The report confirms that more research is also necessary to accurately assess marine mammal reactions to different types of noise and that more work is needed to characterize the seasonal and spatial levels of ambient noise in both the Beaufort and Chukchi seas.[15]

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[9] In fact, the passage of the MMPA was driven in part by a lack of adequate information about marine mammals. 16 U.S.C. § 1361(3) (noting that there is "inadequate knowledge" of marine mammals). *See also* Dr. Jane Lubchenco, Keynote Speech, Arctic Symposium (June 20, 2011) (stating "when in doubt, err on the side of caution"), available at http://www.noaanews.noaa.gov/stories2011/20110620_arcticice.html.

[10] NMFS, Comments on Minerals Management Service Draft Environmental Impact Statement for the Beaufort Sea and Chukchi Sea Planning Areas – Oil and Gas Lease Sales 209, 212, 217, and 221 at 3 (March 27, 2009) (NMFS Multi-Sale Cmts); *see also* NMFS, Authorization of Small Takes Under the Marine Mammal Protection Act for Certain Oil and Gas Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska for 2010 at 71 (July 13, 2010) (2010 BiOp) ("Because recent data are not sufficient to evaluate current habitat use by season or area in the Chukchi Sea by bowhead, humpback, or fin whales, we cannot fully estimate the consequences of industrial noise on these species.").

[11] National Oceanic and Atmospheric Administration (NOAA), Comments on the U.S. Department of the Interior/MMS Draft Proposed Outer Continental Shelf (OCS) Oil and Gas Leasing Program for 2010-2015 at 9 (Sept. 9, 2009).

[12] *See, e.g.*, Joint Subcommittee on Ocean Science & Technology, Addressing the Effects of Human-Generated Sound on Marine Life: An Integrated Research Plan for U.S. Federal Agencies at 3 (Jan. 13, 2009) (stating that the current status of science as to noise effects "often results in estimates of potential adverse impacts that contain a high degree of uncertainty"); *id.* at 62-63 (noting the need for baseline information, particularly for Arctic marine species); National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (Nat'l Commission), Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling, Report to the President at vii (January 2011) (finding that "[s]cientific understanding of environmental conditions in sensitive environments . . . in areas proposed for more drilling, such as the Arctic, is inadequate"); Nat'l Commission, Offshore Drilling in the Arctic: Background and Issues for the Future Consideration of Oil and Gas Activities, Staff Working Paper No. 13 at 19 (listing acoustics research on impacts to marine mammals as a "high priority"). The uncertainty extends to other species as well, particularly fish, which are an important part of the diet for some marine mammals. *See* NMFS, Comments on MMS Draft EIS for the Chukchi Sea Planning Area – Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea at 2-3 (Jan. 30, 2007) (NMFS Sale 193 Cmts); NMFS Multi-Sale Cmts at 16; NOAA, Comments on BOEMRE Draft Supplemental EIS for the Chukchi Planning Area – Oil and Gas Lease Sale in the Chukchi Sea at 3-5 (Feb. 28, 2011).

[13] United States Geological Survey, An Evaluation of the Science Needs to Inform Decisions on Outer Continental Shelf Energy Development in the Chukchi and Beaufort Seas, Alaska, Circular 1370 at 59, 179 (2011) (USGS Report), available at http://pubs.usgs.gov/circ/1370/. The proposed IHA does not refer to the USGS findings.

[14] USGS Report at 52, 179-182.

[15] *Id.* at 176.

More pointedly, NMFS has warned that, without better data, it is difficult to make the findings that are legally required to authorize marine mammal harassment.[16] We agree. The lack of adequate information precludes NMFS from ensuring compliance with the demanding standards of the MMPA and should compel NMFS to defer all oil and gas-related marine mammal harassment authorizations while the necessary information is gathered. A deferral is especially appropriate for the Chukchi Sea, where the information gaps are perhaps the most daunting.[17]

B. Potential for Serious Injury

In 1994, Congress amended the MMPA to add provisions that allow for the incidental harassment of marine mammals through IHAs, as has been proposed for Shell's exploration drilling. All IHAs are limited to activities that will result in only the "taking by harassment" of marine mammals.[18] For those activities that could result in "taking" other than harassment, interested parties must continue to use the pre-existing procedures for authorization through specific regulations, often referred to as "five-year regulations."[19]

In 1996, NMFS issued regulations implementing the 1994 amendments to the MMPA.[20] The regulations emphasize that an IHA in the Arctic cannot be used for "activities that have the *potential* to result in serious injury or mortality[.]"[21] In the preamble to the proposed regulations, NMFS explained that if there is a potential for serious injury or death, it must either be "negated" through mitigation requirements or the applicant must instead seek approval through five-year regulations.[22]

The caution exhibited by NMFS in promulgating the 1996 regulations is consistent with the MMPA's general approach to marine mammal protections. Legislative history confirms that at the time of the MMPA's original passage Congress intended to build in a "conservative bias" that would avoid adverse or irreversible effects "until more is known."[23] The committee report that accompanied the House version of the 1994 amendments emphasizes that the IHA provisions were not intended to "weaken any of the existing standards which protect marine mammals and their habitats from incidental takes[.]"[24] Thus, the 1994 amendments expressly

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[16] NMFS Sale 193 Cmts at 2; NMFS Multi-Sale Cmts at 3-5.
[17] BOEM recently re-affirmed its decision to hold Lease Sale 193. It did so despite recognizing that the EIS for the sale identifies literally hundreds of data gaps for the Chukchi Sea relevant to potentially significant effects. Contrary to its stated commitment to base decisions on good science, its legal obligations, and basic common sense, however, BOEM determined that none of the missing information is essential at the lease sale stage. *See* BOEMRE, Final Supplemental EIS Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, OCS EIS/EA BOEMRE 2011-041 at Appendix A (Aug. 2011) (Lease Sale 193 SEIS), available at http://alaska.boemre.gov/ref/ProjectHistory/Chukchi193/Chukchiindex.htm. Still, even BEOM noted that the information it dismissed as unnecessary to the lease sale decision "may, in fact, be essential at a later stage of OCS Lands Act." *Id*. at A4. It is just such a later stage that NMFS now confronts.
[18] 16 U.S.C. § 1371(a)(5)(D)(i).
[19] *See id*. § 1371(a)(5)(A).
[20] 61 Fed. Reg. 15,884 (April 10, 1996).
[21] 50 C.F.R. § 216.107 (emphasis added).
[22] 60 Fed. Reg. 28,379, 28,380-81 (May 31, 1995).
[23] H.R. Rep. 92-707, at 5 (1971) *reprinted in* 1972 U.S.C.C.A.N. 4144, 4148.
[24] H.R. Rep. 103-439, at 37 (1994).

brought a great number of activities within the jurisdiction of the MMPA, and at the same time, preserved the existing five-year regulation process for those activities that risked the possibility of more serious marine mammal take.

The proposed IHA indicates that to meet the "potential" threshold a proposed activity must be "reasonably expected or likely" to result in serious injury or mortality.[25] This approach conflates two very different regulatory provisions that govern the issuance of IHAs. A "negligible impact" determination expressly relies on the phrasing "reasonably expected" and "reasonably likely[.]"[26] The proposed IHA has imported this standard despite the clear choice of an entirely different term ("potential") in § 216.107; a term that is commonly defined much more broadly to include even those things "existing in possibility[.]"[27]

Last year's *Deepwater Horizon* disaster underscored the inherent risks of exploration drilling in frontier environments. Indeed, the risk of well-control incidents is substantially *higher* during exploration drilling activities than it is during development, as was recently acknowledged by Bureau of Ocean Energy Management (BOEM).[28] More accurately, as NMFS has recognized, no amount of regulatory oversight can alter the fact that spills are an inevitable byproduct of oil and gas operations.[29] And, as NMFS and others have recognized, oil spills can

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[25] 76 Fed. Reg. 69,958, 69,976 (Nov. 9, 2011); *see also id*. at 69,977 ("reasonably expected to occur").

[26] *See* 50 C.F.R. § 216.103. Moreover, NMFS has recognized that even when applying the MMPA's "negligible impact" standard the "probability of occurrence of impacts must be balanced with the potential severity of harm to the species[.]" 54 Fed. Reg. 40,338, 40,343 (Sept. 29, 1989). There is no indication that NMFS considered the dire consequences of a spill when determining whether the "potential" for serious harm exists.

[27] *See* Merriam Webster's New Collegiate Dictionary 900 (1974); *see also id*. ("capable of development into actuality"). The Supreme Court has observed that the concept is "inherently probabilistic[.]" *James v. U.S*., 550 U.S. 192, 207 (2007) (reviewing the terms "potential" and "risk"); *see also Forest Conservation Council v. Rosboro Lumber Co*., 50 F.3d 781, 784-85 (9th Cir. 1995) (noting that a "potential injury" is one that "may or may not occur"). *Cf.* 59 Fed Reg. 50,372, 50,373 (Oct. 3, 1994) (concluding that although "most" population surveys do not result in injury to marine mammals, a 1,000 foot threshold for aerial surveys is required to qualify for a general authorization based on the assumption that a stampede in a pinniped haul out area would occur with the "potential" to injure pups).

[28] Lease Sale 193 SEIS, Appendix B at B2-B3 (Aug. 2011). *See also* Pew Environment Group, Oil Spill Prevention and Response in the U.S. Arctic Ocean: Unexamined Risks, Unacceptable Consequences at 37 (2010) (noting that from 1992 to 2006, the rate in the United States "was one blowout for every 387 wells drilled, for 39 total blowouts through the end of the 1990s"); WWF-Canada, Arctic Offshore Drilling Review, NEB File: OF-EP-Gen-AODR 01 Suggested Studies and Preliminary Response to CFI #1 and CFI #2 at 9 (Nov. 29, 2010) (noting information indicating "4 blowouts from a total of 647 wells in Canadian offshore waters, or one in every 162 wells drilled").

[29] 75 Fed. Reg. 77,476, 77,487 (Dec. 10, 2010) ("Although planning, management, and use of best practices can help reduce risks and impacts, the history of oil and gas activities, including recent events, indicates that accidents cannot be eliminated. Tanker spills, pipeline leaks, and oil blowouts are likely to occur in the future, even under the most stringent regulatory and safety systems"). NMFS cites the 2008 Bercha report for its calculation of the risks of an oil spill from exploration drilling. 76 Fed. Reg. at 69,976. The Bercha report shows that blowouts that could spill large quantities of oil occur during exploration drilling. For example, it states that 3.5 out of every 10,000 exploration wells drilled in water between 30 and 60 meters deep, as the wells here would be, would result in a well blowout equal to or greater than 150,000 barrels of oil. Bercha Group, Alternative Oil Spill Occurrence Estimators and their Variability for the Chukchi Sea—Fault Tree Method, OCS Study MMS 2008-036 at 4.29 (table 4.17). (March 2008). More than six out of every 10,000 would result in a blowout spill between 10,000 and 149,999 barrels of oil. *Id*. Another table in the report indicates that spills are over two and a half times more likely to occur during exploration well drilling than during development well drilling. *Id*. at 2.9 (table 2.9) (compare exploration well overall spill frequency of 25.05 with development well drilling frequency of 9.15).

have devastating effects on marine life, particularly seals.[30] Applying the proper standard, NMFS cannot conclude that Shell may proceed with an IHA.

C. Counting Marine Mammals

The number of marine mammals that will be potentially harassed by Shell's proposed oil and gas exploration activities is necessary to determine not only whether a proposed IHA exceeds the MMPA's "small numbers" limitation but also whether there will be non-negligible impacts.[31] The estimates of take in the proposed IHA raise a number of concerns.

1. Density and Marine Mammal Movements

The proposed IHA adopts Shell's strict density approach to counting harassed marine mammals. This approach, however, does not does not consider the animals' natural movements or the time period over which the activity occurs.

The proposed IHA determines the number of exposed marine mammals by multiplying their expected seasonal densities by the area that will be exposed to 120 dB of sound. This method ignores the fact that each well is projected to require 32 days of drilling, with the *Discoverer* producing noise in each location for approximately a month's time.[32] Marine mammals will inevitably move in and out of the disturbance zone – or will be deflected away from the disturbance zone – and potentially suffer MMPA harassment as a result.[33] There is no indication that the proposed IHA considers marine mammal movement for time period over which the activities will occur.[34]

This issue is particularly acute when considering the movement of migratory species, such as bowhead and beluga whales. The proposed IHA's calculations are premised on the notion that a bowhead whale exposed, for example, on day 1 during the fall drilling season

[30] 76 Fed. Reg. at 69,979 (noting that there is "a likelihood that newborn seal pups, if contacted by oil, would die from oiling through loss of insulation and resulting hypothermia"); *id*. (noting that effects of a spill "could be severe if seals surface in heavy oil slicks in leads or if oil accumulates near haul-out sites"). *See also id*. at 69,978 (noting that the continued exposure of oil to the eyes of whales, as with ringed seals, "could cause permanent damage"); *id*. (questioning whether baleen function would be restored after oiling in the Arctic); *id*. (noting greater risk to whales if oil appears in the spring lead system); *id*. at 69,979 (noting that seals under natural stress, such as when molting or nursing young, "could potentially die because of the additional stress of oiling"); NOAA, Comments on the U.S. Department of the Interior / Mineral Management Service Draft Proposed Outer Continental Shelf Oil and Gas Leasing Program for 2010-2015 at 5 (Sept. 21, 2009) (stating that a spill in the Arctic "could have severe consequences on living marine resources at a regional or population level."); Lease Sale 193 EIS at II-37 ("significant effects could occur to belugas . . . in the event of a large oil spill"); Lease Sale 193 SEIS at 235-44 (discussing effects of a large spill on seals); *id.* at 194-95 (noting risks to bowhead whales); *id*. at 201 (noting potential harm to gray whales); *id*. at 203 (noting potential harm to beluga whales).

[31] *See* 76 Fed. Reg. at 70,000 (noting that the negligible impact analysis depends in part on the "number, nature, intensity, and duration of Level B harassment").

[32] *Id*. at 69,961.

[33] *Natural Res. Def. Council v. Evans*, 279 F. Supp. 2d 1129, 1157 (N.D. Cal. 2003) (observing that the MMPA language appears to support the conclusion that all of the animals in a population are harassed "if there is the potential for the act to disrupt the behavioral patterns of the most sensitive individual in the group").

[34] The estimations of take from ice management/ice breaking and seismic surveying appear to suffer from a similar flaw 76 Fed. Reg. at 69,995.

remains fixed in place and that no other bowheads will travel through the area for the remaining 31 days. Yet the entire bowhead population migrates through the Chukchi Sea on the way to the Bering Sea. As Shell succinctly states in its incidental harassment authorization application for its Beaufort Sea exploration drilling, when "most bowhead whales will be migrating . . . it is less accurate to assume that the number of individuals present in the area from one day to the next will be static."[35] Although the whales' fall migration pattern through the Chukchi Sea is more diffuse, there is no question that whales will migrate past the drill sties. The densities used by NMFS reflect the fact that it is "more likely that bowheads will be encountered in the Chukchi Sea" during the fall.[36] But higher density alone still does not capture movement over time. Density provides only a snapshot of marine mammal presence, and NMFS must consider what happens when that snapshot is extended over 30-plus days of industrial activity at each well site.[37]

2. Noise Produced by the Discoverer

NMFS must also consider whether the calculated distance to the 120-dB contour for the *Discoverer* is accurate. The estimated source levels for the *Discoverer* and the *Kulluk* are extremely close (approximately 185 dB). Yet in the proposed IHA for Shell's Beaufort Sea drilling, NMFS's modeling indicates that the *Discoverer* 120 dB radius extends to 3.3 kilometers, nearly 10 kilometers less than the *Kulluk*.[38] It appears that the same modeling was applied to the *Discoverer*'s estimated disturbance zone in the Chukchi Sea,[39] resulting in a 120-dB radius of only 1.3 kilometers. In light of this anomaly, NMFS must provide a full analysis of this difference in order to support its modeling and its conclusions as to the size of the disturbance zone.[40]

Additional factors call into question the proposed IHA's conclusions as to the degree of disturbance that will result from the *Discoverer*'s operations: the source-level measurements that underlie the modeling only measured noise from bottom-mounted hydrophones rather than using receivers at a variety of depths; louder noise sources other than drilling equipment, such as the drillship's thrusters were not addressed; and the modeling does take into account the conditions in the Arctic that may lead to more efficient propagation.[41] NMFS cannot justify its conclusions in the proposed IHA as to the effects of Shell's operations without carefully considering these issues.

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[35] Shell, Application for Incidental Harassment Authorization for the Non-Lethal Taking of Whales and Seals in Conjunction with Planned Exploration Drilling Program During 2012 Near Camden Bay in the Beaufort Sea, Alaska at 33 (Aug. 2011).

[36] 76 Fed. Reg. at 69,993; *see also id*. at 69,991 (noting that in the fall beluga whale densities are expected to be higher due to migration).

[37] This issue is discussed in the attached statement of Dr. David Bain. Ex. 1 at 4, 8-9.

[38] 76 Fed. Reg. 68,974, 69,011 (Table4) (Nov. 7, 2011).

[39] *Compare id*. at 69,011 *with* 76 Fed. Reg. at 69,994 (noting the acoustic propagation model used).

[40] Moreover, the most recent Arctic drilling conducted by the *Kulluk* resulted in noise exceeding 130 dB at a distance of 75 kilometers. Hall, *et al.*, 1993 Kuvlum Exploration Project Site Specific Monitoring Program Final Report at 102-04 (May 20, 1994). *See also* Lindow, Emily, NOAA, Email to Joseph C. Talbott, BOEMRE, Re. 1001-03b and 1101-02a(2) Camden Bay EP – Draft EA Review at pdf pg. 15 (July 28, 2011) (noting "similar" source levels), attached as Ex. 2.

[41] These issues are discussed in more detail in the attached statement. *See also* Ex. 1 at 2-3.

3. Harassment Thresholds

The proposed IHA calculates harassment based on the exposure of marine mammals to impulse sounds (airgun surveying) at or above 160 dB and non-impulse sounds (drilling and ice breaking) at or above 120 dB. NMFS's uniform marine mammal harassment thresholds, however, do not consider the documented reactions of specific species found in the Arctic to much lower received levels. Critically, the generic thresholds do not reflect the MMPA definition of harassment to include even those actions with the "potential" to disturb marine mammals. That definition supports the conclusion that all of the animals in a population are harassed "if there is the *potential* for the act to disrupt the behavioral patterns of the most sensitive individual in the group."[42]

For example, studies confirm that migrating bowhead whales react to impulse sounds well below 160 dB. A 2007 comprehensive review of existing literature found that for migrating bowheads "the onset of *significant behavioral disturbance* from multiple pulses occurred at [received levels] around 120 dB re: 1 μPa[.]"[43] Gray whales are also known to react to impulsive sounds below 160 dB.[44] Migrating bowheads may respond to non-impulsive noise below the 120-dB threshold as well: the recent USGS report notes reactions to drillship noise at 110-115 dB.[45] Migrating bowheads may avoid icebreaking at distances of up to 25 kilometers.[46] The USGS report recognizes the well-documented phenomenon of beluga whales responding to icebreakers at great distances, considered "among the most cited and dramatic in the literature."[47] Reactions have been detected as far as 80 kilometers away.[48] Drilling noise has also provoked reactions in beluga whales below the 120-dB threshold.[49] Harbor porpoises similarly have been shown to be exceptionally sensitive to noise, and NMFS has used 120 dB as the appropriate threshold when authorizing marine mammal take for Navy sonar activities.[50]

As it has expressly stated in response to previous comments, NMFS may be seeking a sound level that can be applied uniformly to all marine species in the Arctic by using generic harassment thresholds.[51] This approach is undoubtedly more efficient, but it is not scientifically sound. Indeed, in other contexts, NMFS has recognized that a more nuanced approach is appropriate. For military exercises, NMFS now uses "behavior risk functions" designed to

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[42] *Natural Res. Def. Council*, 279 F. Supp. 2d at 1157 (emphasis added).
[43] Southall, et al., Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations, 33(4) Aquat. Mamm. 446, 452 (2007) (Southall 2007) (emphasis added). *See also* 76 Fed. Reg. at 69,971 (noting "strong" avoidance reactions).
[44] National Research Council, Ocean Noise and Marine Mammals at 93-94 (2003).
[45] *Id*. at 92; *see also* USGS Report at 181.
[46] NMFS, Biological Opinion, Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the Marine Mammal Protection Act at 82 (July 18, 2008) (2008 BiOp).
[47] USGS Report at 183.
[48] *Id*.
[49] Southall 2007 at 464 (Table 16); 466 (Table 17).
[50] 73 Fed. Reg. 60,754, 60,806 (Oct. 14, 2008) (noting harbor porpoise data suggesting "a very low threshold level of response [to a variety of sound sources] for both captive and wild animals").
[51] 75 Fed. Reg. 49,710, 49,716 (Aug. 13, 2010) (responding to the comment that bowheads react to lower sound levels, NMFS stated that it "believes that it cannot scientifically support adopting any single SPL value below 160 dB and apply it across the board for all species and in all circumstances").

capture the potential for responses at a range of thresholds. At a minimum, any final IHA cannot apply thresholds that fail to accurately capture potential marine mammal harassment, as required by the standards imposed by the MMPA.[52]

4. Ice Management and Ice Breaking

The proposed IHA does not adequately analyze the marine mammal harassment that could arise from ice management and ice breaking activities. To accurately calculate the number of marine mammal exposures, it is critical that NMFS consider additional information about ice management and ice breaking: how long it will take place, when it will take place, and where it will take place.

The proposed IHA states that ice management vessels will operate in a fixed 40 degree arc 5 kilometers "upwind" from the *Discoverer*.[53] To determine the area exposed to 120 dB, NMFS assumed a cone-shaped area of operations originating from the drillship and added a buffer equal to the radius for the 120 dB received level.[54] This, however, can overlook overlapping exposures within that area. For example, if a particular location is exposed to 120 dB during one day of ice breaking, when that area is exposed again a day later it cannot be assumed that the marine mammals found there – especially migrating marine mammals – are the same as those previously harassed.

Consequently, it is important to understand how long the vessels will operate within any particular "cone." The proposed IHA observes that ice breakers would be actively managing ice no more than 38 percent of the drilling season, concentrated in the early summer and fall.[55] Shell states that this figure is based on recent ice conditions, but the data are from the Sivulliq site in the Beaufort Sea, hundreds of miles from Shell's proposed Chukchi Sea drilling.[56] In its Clean Air Act application to the Environmental Protection Agency, Shell states only that the "Chukchi Sea is expected to have less ice" but provides no basis for its assertion.[57] Indeed, Shell states that ice "often" accumulates between the Burger drill sites and Hanna Shoal, requiring active ice management.[58] In a previous Chukchi Sea exploration plan, Shell acknowledged that it was "likely" that a well "may be started, temporarily abandoned due to ice conditions and finished later in the same drilling season."[59] Even assuming that the 38 percent figure is correct, there may be significant effects on bowhead whales. The fall migration through the Chukchi Sea can

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[52] *See also* Ex. 1 at 9-16 (discussing marine mammal reactions at lower sound thresholds).
[53] 76 Fed. Reg. at 69,995.
[54] *Id*.
[55] 76 Fed. Reg. at 69,959. *See* Shell, Revised OCS Lease Exploration Plan, Chukchi Sea, Alaska, Appendix F (Chukchi EIA) at 2-24, available at http://alaska.boemre.gov/ref/ProjectHistory/2012_Shell_CK/2012x_.HTM.
[56] *Id*. *See Discoverer* Air. App. at 15. Moreover, if ice management is primarily to address floes that are blown near the drillship by the wind or carried in by ocean currents, it is not clear that ice maps will accurately depict the conditions that may require the vessels' operation. *See* 76 Fed. Reg. at 69,961 (noting use of Naval Ice Center archives).
[57] *Discoverer* Air. App. at 15.
[58] Chukchi EIA at 4-57.
[59] Shell, Exploration Plan, 2010 Exploration Drilling Program Posey Blocks 6713, 6714, 6763, 6764, and 6912 Karo Blocks 6864 and 7007 Burger, Crackerjack, and SW Shoebill Prospects OCS Lease Sale 193 Chukchi Sea, Alaska at 2 (July 2009), available at http://alaska.boemre.gov/ref/ProjectHistory/2009_Chukchi_Shell/Chukchi_2009.HTM.

last late into October, meaning that any ice management during the fall could affect a large number of whales.[60]

Moreover, if the ice management vessels operate in a wider range of locations around the *Discoverer*, the areas of overlap may be reduced, but the total area exposed would increase. As NMFS notes, the ice management vessels will be active "upwind" of the drillship, presumably based on the predominate wind direction. That wind direction will vary throughout the time Shell proposes to drill, requiring the vessels to adjust their operations.[61] Further, Shell and NMFS both acknowledge that the vessels may range as far as 19 kilometers from the *Discoverer*.[62] This could create a significantly larger disturbance zone as marine mammals may be unable to navigate through any undisturbed areas of water that may be available between the drilling and ice breaking. NMFS must also consider the effects of both ice management vessels operating simultaneously but at some distance apart.[63]

5. Vessel Noise

During the 2012 exploration drilling, the *Discoverer* drillship will be accompanied by eight additional vessels, including the primary and secondary ice breakers. The presence of these vessels and the noise that they produce are another source of marine mammal harassment. As with other sources of non-impulsive noise, NMFS applies a 120-dB harassment threshold to determine harassment from vessel noise. In the proposed IHA, NMFS recognizes that vessels can be the source of significant noise: a 2008 study estimated sound pressure levels of 120 dB from a seismic vessel out to a distance of 21 kilometers.[64] Moreover, marine mammals, such as bowhead whales, have been shown to react to moving vessels at significant distances.[65] The proposed IHA nevertheless states simply that "normal" vessel traffic is "not anticipated to impact marine mammals in a manner that would rise to the level of taking[.]"[66] This blanket dismissal is

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[60] Chukchi EIA at 3-99 (noting that the "main part" of the migration in 2006 extended through October 25).
[61] Shell, Chukchi Sea Regional Exploration Oil Discharge Prevention and Contingency Plan at 1-55-56 (Revised May 2011) (noting predominant wind direction in June through November), available at http://alaska.boemre.gov/fo/ODPCPs/2010_Chukchi_rev1.pdf.
[62] 76 Fed. Reg. at 19,962.
[63] Shell, Application for Incidental Harassment Authorization for the Non-Lethal Taking of Whales and Seals in Conjunction with Planned Exploration Drilling Program During 2012 in the Chukchi Sea, Alaska at 12 (Aug. 2011) (noting that "ice-management/anchor handling vessels" will be tasked with ensuring that floes are pushed around the *Discoverer*). It is not clear whether the proposed IHA discounts ice management as opposed to ice breaking activities. Although the proposed IHA assumes that during ice management the "propeller is rotating at approximately 15-20 percent" of the vessel's propeller rotation capacity, resulting in reduced cavitation effects in the water, it does not provide any citation for the claim. 76 Fed. Reg. at 69,960. First-year ice is most likely the type of ice to be encountered, and Shell has noted elsewhere such ice is "most efficiently broken at continuous high speed which involves the highest continuous power production[.]" Shell, Outer Continental Shelf Pre-Construction Air Permit Application Revised, *Frontier Discoverer* Chukchi Sea Exploration Drilling Program at 16 (Feb. 23, 2009) (*Discoverer* Air. App.) (footnote omitted).
[64] 76 Fed. Reg. at 69,961-62.
[65] *See* BOEMRE, Environmental Assessment, Beaufort Sea Planning Area, 2012 Revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Beaufort Sea, Alaska at 86 (Aug. 2011), available at http://boem.gov/Oil-and-Gas-Energy-Program/Plans/Regional-Plans/Alaska-Exploration-Plans/2012-Shell-Beaufort-EP/Index.aspx (noting bowhead whale reactions); *see also* 2008 BiOp at 82 (noting predicted responses by bowheads to an icebreaker operating in open water).
[66] 76 Fed. Reg. at 69,961.

unjustified. To satisfy the MMPA, NMFS must determine whether the projected increase in vessel presence and vessel noise around the drill sites and during transit across the Arctic have the "potential" to disturb marine mammals.[67]

D. Specific Marine Mammals

1. Bowhead whales

As noted, there are number of problems with the proposed IHA's assessment of potential effects on bowhead whales, including how harassed whales are counted, the thresholds for MMPA harassment, and the extent of missing information. These issues preclude NMFS from finding that the marine mammal take associated with Shell's activities can meet the protective standards of the MMPA.[68]

In addition to the USGS report highlighted *supra*, we additionally emphasize here some of the missing information specific to bowhead whales that have been highlighted as part of BOEM's review of Chukchi Sea lease sale 193. For example, BOEM has found that there are situations in which the effects of exploration would be greater than typically assumed, such a disturbance that occurs where large aggregations of whales are present.[69] Data, however, are lacking on where precisely such aggregations can be expected to occur.[70] NMFS cites to tagging data that "suggest" whales do not spend time feeding or resting near the drill sites, but the results are based on a limited number of whales over just a few years' time.[71] Given the lack of information, the proposed IHA should not simply assume that the "closest primary feeding ground" is near Point Barrow.[72]

Further, understanding the effects of Shell's proposed drilling on bowhead cows and calves is essential to any assessment. Bowhead whales are a long-lived, late-maturing species with relatively low reproductive rates and extremely high maternal investment in their young. Any potential impacts on females and calves merit "special consideration."[73] The ability of a

[67] There is also the risk that a vessel could collide with a whale, resulting in serious injury or death.
[68] *See also* Ex. 1 at 4-10.
[69] MMS, Final Environmental Impact Statement, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, OCS EIS/EA MMS 2007-026 at IV-102 (May 2007) (Lease Sale 193 FEIS), available at http://www.alaska.boemre.gov/ref/EIS%20EA/Chukchi_FEIS_193/feis_193.htm.
[70] *Id*. at IV-101 (current data unavailable to typify summer use of Chukchi Sea); *id*. at IV-103 (insufficient data to determine fall migration paths and how intensively bowheads feed during fall migration through the Chukchi Sea); *see also* USGS at 182 (finding 6.09) (noting that data are "not yet sufficient to confidently determine the times and places where whales might be most impacted by anthropogenic sounds").
[71] Alaska Dep't of Fish and Game, Satellite Tracking of Western Arctic Bowhead Whales, OCS Study BOEMRE 2010-033 at 15 (July 2010) (noting conclusions based on 15 of 19 tagged whales over three years). Missing information similarly precludes full assessment of the effects of a large oil spill on bowhead whales, and this should necessarily alter how NMFS assesses the "potential" for serious injury or death. *See* Lease Sale 193 FEIS at IV-121 ("if a large spill of fresh oil . . . contacted one or more large aggregation of bowheads especially (but not exclusively) if such an aggregation contained large numbers of females and calves.").
[72] 76 Fed. Reg. at 70,000. Indeed, at a minimum, there is evidence of bowheads frequenting the area around Point Franklin. *See* Clarke and Ferguson, Aerial Surveys of Large Whales in the Northeastern Chukchi Sea, 2008-2009, with Review of 1982-1991 Data at 12 (Figure 5) (SC/62/BRG13).
[73] MMS, Final Programmatic Environmental Assessment, Arctic Outer Continental Shelf Seismic Surveys – 2006 at 110 (June 2006) (2006 PEA).

female bowhead whale to provide adequate care to her offspring during its period of dependency is "critical to the continued recovery and the long-term viability of the population."[74] Bowhead cow-calf pairs are thought to be more sensitive to noise and, therefore, are more likely to respond to disturbances at lower thresholds.[75] Cow-calf pairs migrate will migrate through the Chukchi Sea as part of the fall migration.[76] NMFS must examine whether bowhead cows and calves will suffer from Shell's activities and whether that could result in a greater degree of harm to the population. Avoiding such harm requires mitigation measures specific to cows and calves, such as a safety zone, as has been required in the past.[77]

2. Belugas

As with bowhead whales, NMFS must consider potential effects on beluga mothers and calves and must evaluate whether enough is known about beluga habitat use to accurately predict the degree of harm expected from Shell's multi-year drilling operation.[78] For example, BOEM found that "[i]f noise causes disruption of important behaviors such as mating, nursing, or feeding, or if animals are scared away from important habitat over long periods of time, then these impacts [of noise and disturbance from lease sale activities] could affect the long-term survival of the population."[79] Moreover, as noted, beluga whales are known to be extraordinarily sensitive to noise. Beluga reactions to icebreakers are well documented, and although responses vary, belugas have been shown to flee from vessel noises as well.[80] Belugas may react to drilling noise at thresholds as low as 110 dB.[81] There will be some degree of ice management during Shell's drilling and a considerable number of support vessels are included in the operation. Nevertheless, the proposed IHA's negligible impact assessment provides very little discussion of beluga whales at all.[82] In sum, the proposed IHA does not provide sufficient justification for its findings that the proposed taking of beluga whales will not violate the MMPA.[83]

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[74] *Id*.
[75] *See* 2008 BiOp at 86 (noting that in other species "females with young are more responsive to noise and human disturbance than other segments of the population"); 2006 PEA at 111 (noting heightened response of female baleen whales accompanied by calves).
[76] *See* Ex. 1 at 6, 9 (discussing cow-calf use of Chukchi Sea).
[77] *See, e.g*., NMFS, Finding of No Significant Impact for the Issuance of an Incidental Harassment Authorization to Shell Offshore Inc., to Take Marine Mammals Incidental to Conducting an Offshore Drilling Program in the Beaufort Sea off Alaska at 3-4 (Oct. 24, 2007) (2007 FONSI). This issue is discussed in more detail, *infra*.
[78] USGS Report at 184 (for beluga whales, the "present understanding of the essential spatial and temporal habitat needs . . . in the Arctic is limited and constrains the ability to confidently understand and efficiently mitigate potential anthropogenic noise impacts").
[79] Lease Sale 193 FEIS at IV-154; *see also id*. at IV-155 (evidence of whales changing behavior and lost feeding opportunities due to vessel disturbance "suggest" that "avoiding impacts to important feeding areas would provide considerable benefits to cetaceans"); USGS Report at 184.
[80] NRC Report at 94-95. Belugas' strong reactions to noise call into question the proposed IHA's reliance on observations from vessels during non-seismic periods to determine density. 76 Fed. Reg. at 69,991-92.
[81] *See* Southall 2007 at 464 (Table 16); 466 (Table 17).
[82] 76 Fed. Reg. at 70,000-01. The proposed IHA appears to rely on a population estimate for the Beaufort Sea stock rather than the significantly smaller Chukchi Sea stock. *Compare* 76 Fed. Reg. at 70,000 (Table 8) *with* Shell, Revised OCS Exploration Plan, Camden Bay, Beaufort Sea, Alaska, Appendix F at 3-70 (May 2011), available at http://boem.gov/Oil-and-Gas-Energy-Program/Plans/Regional-Plans/Alaska-Exploration-Plans/2012-Shell-Beaufort-EP/Index.aspx. Both are found in the Chukchi Sea during the fall. 76 Fed. Reg. at 69,991.
[83] *See* Ex. 1 at 11-13.

3. Harbor porpoise

As noted above, harbor porpoise are extremely sensitive to noise and disturbance. In order to comply with MMPA directives NMFS must also address the fact that the unofficial Bering Sea "stock" is based on "arbitrarily set geographic boundaries."[84] NMFS maintains that the Bering Sea stock may number as many as 48,215; however, stock assessments completed elsewhere have identified smaller stocks from what had been larger groupings.[85] Smaller stocks of a species tend to be more vulnerable to harm caused by human activities.[86] In sum, the proposed IHA does not provide sufficient justification for its findings that the proposed taking of harbor porpoise will not violate the MMPA.[87]

4. Gray whales

Shell proposes to drill near Hanna Shoal, a "common gray whale feeding ground."[88] Shell's operations may block gray whales' access to this habitat or cause them to abandon their feeding.[89] Such consequences increase the risk that gray whales may lose essential energy acquisition opportunities and as a result, may cause harm to the population. Shell recognizes that feeding disruptions could result from ice management close to Hanna Shoal and that the ice that "often" accumulates between the Burger drill sites, requiring active ice management.[90] The proposed IHA notes that ice management/ice breaking could occur as far as 19 kilometers from the drillship.[91] Hanna Shoal is located just 40 kilometers from the proposed drill sites.[92] NMFS must also consider the state of the population. Gray whale numbers have declined since Endangered Species Act (ESA) protections were removed in 1994, and there is speculation that the population is responding to environmental limitations.[93] In sum, the proposed IHA does not provide sufficient justification for its findings that the proposed taking of gray whales will not violate the MMPA.[94]

5. Ice Seals

Any final IHA must analyze the 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

[84] Lease Sale 193 FEIS at III-78 – III-79.
[85] Ex. 1 at 14-15. Shell's EIA indicates that the Bering Sea group of harbor porpoise has been estimated at 16,271. Chukchi EIA at 3-78.
[86] Ex. 1 at 15, 16.
[87] *Id*. at 16.
[88] 76 Fed. Reg. at 70,000.
[89] NRC, Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects at 14 (2005) (noting that gray whales have been shown to abandon habitat in response to anthropogenic noise).
[90] Chukchi EIA at 4-57.
[91] 76 Fed. Reg. at 69,962.
[92] *Id*. at 69,983.
[93] Lease Sale 193 FEIS III-79.
[94] Ex. 1 at 10-11.

histories for each. NMFS should apply a cautionary approach given the recognition that "[t]here is a basic lack of information about ice seals."[95]

A recent outbreak of skin lesions and sores among ringed seals, accompanied by higher than normal levels of mortality, complicates this analysis.[96] To date, most reports have come from around Barrow, and the weakened state of the population should be considered as part of NMFS's analysis.[97]

Even if all the seal populations were robust, allowing additional offshore industrial activity risks harm. Low-frequency noise can mask biologically significant sounds, and Shell's operations – including drilling, ice breaking, vessel movements, and low-flying aircraft – could also disrupt normal behavior, causing seals not only to flee preferred habitat but expend extra energy in doing so.[98] NMFS also should consider whether Shell's ice management efforts have the potential to seriously injure or kill ringed seals resting on pack ice.[99]

In sum, the proposed IHA does not provide sufficient justification for its findings that the proposed taking of ice seals will not violate the MMPA.

E. Cumulative Effects

The proposed IHA does not assure that permitted activities will have no more than negligible impacts on marine mammals without looking at both the activities scheduled to take place this summer in the Arctic Ocean and the activities planned for the near future.

Although NMFS has resisted considering cumulative effects in the past, the plain language of the MMPA's incidental take provisions requires affirmative findings that the resulting effects of authorized takings will have no more than "negligible" effects on marine mammals and no "unmitigable adverse impact" on subsistence uses.[100] As a practical matter, if NMFS ignores all additional sources of noise and disturbance, its MMPA determinations will lack a rational basis. This is especially true given that NMFS has cautioned that multiple exploration activities (seismic surveying, ice management, drilling) can create a biologically

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[95] USGS Report at 187; *see also id*. ("Key information about the abundance, distribution, and vital aspects of ice seals is incomplete"). Ex. 2 at pdf pg. 51 (NMFS's "lack of understanding about ice seal stock structure in general means we are unsure about what stock is potentially being impacted in a specific area"). As noted, *infra*, portions of the ringed and bearded seal populations have also been proposed for listing pursuant to the ESA. The ribbon seal is considered a ''species of concern'' under the ESA. The proposed listings were prompted, in part, by the effects of climate change on ice seal habitat, and the added stress of diminishing habitat should be considered in NMFS's analysis here. *See* 75 Fed. Reg. 77,496, 77,511-12 (Dec. 10, 2010) (discussing sea ice losses); 75 Fed. Reg. at 77,492 (same).

[96] NOAA, 2011 Arctic Seal Disease Outbreak Fact Sheet (updated Nov. 22, 2011). Some spotted and bearded seals have shown symptoms as well.

[97] *Id*.

[98] MMS, Draft Environmental Impact Statement, Beaufort Sea and Chukchi Sea Planning Areas, Oil and Gas Lease Sales 209, 212, 217, and 221, OCS EIS/EA MMS 2008-0055 at 4-185-86 (2008), available at http://alaska.boemre.gov/ref/ProjectHistory/ArcticMultiSale_209/ArcticMultiiindex.htm.

[99] *Id*. at 4-181; *cf*. 76 Fed. Reg. at 69,985 (discussing seals and ice management).

[100] 16 U.S.C. § 1371(a)(5)(D)(i).

significant risk to marine mammals.[101] The scientific review panel created for the Open Water Meeting has urged that there is a need "for better analysis of the potentially interacting influences of multiple oil and gas activities co-occurring in time and space[.]"[102] Courts have sensibly applied the same principle in other contexts when confronted with an agency's failure to evaluate the effects of multiple activities.[103]

It is essential that NMFS consider the multiple years of Chukchi Sea drilling in combination with Shell's related proposal to drill in the Beaufort Sea, which will affect thousands of bowhead whales before they reach the Chukchi Sea drill sites. Other activities are relevant to this analysis as well. Both ConocoPhillips and Statoil have indicated that they are preparing for exploratory drilling in the Chukchi Sea beginning in 2013, which – combined with Shell's efforts – could result in three drilling operations in close proximity to one another.[104] The State of Alaska recently expressed a strong interest in exploiting oil and gas reservoirs that can be accessed in state waters. The State's lease sales could prompt seismic surveying as companies determine potential locations for exploration. NMFS has indicated that ION Geophysical intends to conduct its Beaufort Sea 2D surveying in 2012, and Shell may soon propose exploration drilling on its leases in Harrison Bay.[105] To comply with the MMPA, NMFS must also determine what industrial activities are planned in Canadian and Russian waters for 2012 and beyond.[106] NMFS cannot accurately assess the potential for harm from Shell's proposed marine mammal harassment in the Chukchi Sea without considering effects in the context of these other activities occurring throughout the Arctic.

F. Least Practicable Impact/Monitoring Requirements

Pursuant to the MMPA, an IHA must prescribe "means of effecting the least practicable impact" on a species or stock and its habitat. 16 U.S.C. § 1371(a)(5)(D)(ii)(I). As is clear from

[101] *See, e.g.*, 2008 BiOp at 86.
[102] Expert Panel Review of Monitoring and Mitigation Protocols in Applications for Incidental Take Authorizations Related to Oil and Gas Exploration, Including Seismic Surveys, in the Chukchi and Beaufort Seas at 9 (March 2010) (2010 Expert Panel Review). *See also* Expert Panel Review of Monitoring Protocols in Applications for Incidental Harassment Authorizations Related to Oil and Gas Exploration in the Chukchi and Beaufort Seas, 2011: Statoil and ION Geophysical at 4-5 (March 9, 2011). It is also discussed extensively in the recent USGS report on the Arctic.
[103] *See Or. Natural Res. Council Fund v. Goodman*, 505 F.3d 884, 893 (9th Cir. 2007) ("A particular action may seem unimportant in isolation, but that small action may have dire consequences when combined with other actions.").
[104] ConocoPhillips has already submitted its exploration plan to BOEM, available at http://alaska.boemre.gov/ref/ProjectHistory/2011_Chukchi_COP/draftEP/draftEPx.HTM.
[105] Ex. 2 at pdf pg. 66. Interested parties will likely soon begin submitting IHA applications to NMFS in advance of the 2012 Open Water Meeting. NMFS should review these as well before making a final determination on Shell's IHA application.
[106] After a lull of two decades, activity is once again increasing in Canadian waters. Several companies have purchased exploration rights for areas in the Beaufort Sea. For example, Imperial Oil has committed to spending $585 million on drilling there. CBC News, Offshore Oil Drilling Debated at Arctic Meetings (Sept. 12, 2011), available at: http://www.cbc.ca/news/business/story/2011/09/12/north-national-energy-board-roundtable-offshore-oil.html. The largest potential future development in the region is the Mackenzie Gas Project, a pipeline through the Mackenzie River corridor to transport natural gas to market.

the language chosen by Congress, the emphasis is on reducing effects to the lowest level possible.[107] The MMPA also requires measures to ensure the monitoring and reporting of marine mammal takes.[108]

NMFS should consider and impose restrictions in Shell's marine mammal take authorization to avoid late-season drilling.[109] The proposed IHA observes that a spill late in the year could remain trapped in the ice until the spring, re-emerging in the lead system and threatening more significant harm to migrating beluga and bowhead whales.[110] Were a spill to occur in the fall, clean-up methods – unproven in the harsh Arctic environment – will be inadequate. Moreover, conditions could result in a spill continuing unchecked through the winter months. NMFS and others have recognized that the difficulties experienced in stopping and containing the oil blowout at the *Deepwater Horizon*, "where environmental conditions and response preparedness [we]re comparatively good, point toward even greater challenges of attempting a similar feat in a much more environmentally severe and geographically remote location."[111] NMFS should independently evaluate whether curtailing drilling earlier in the open water season would benefit bowheads by avoiding the peak of their migration through the Chukchi Sea.

In the past, NMFS has typically required multiple safety zones through the IHA process to protect marine mammals in the Beaufort Sea from the harmful effects of exploration activities. Previous IHAs required shut downs/power downs based on the presence of multiple whales engaging in biologically significant behavior (such as feeding) or the presence of cow-calf pairs.[112] Although spatial-temporal based exclusions are generally preferable given the difficulties of real-time marine mammal monitoring, these measures attempt to address the frequently expressed concerns of both NMFS and BOEM that, in order to avoid population level effects, activities should avoid disrupting biologically significant activities, particularly when cow-calf pairs are present.[113]

Based on the possibility of ice management alone, avoiding unnecessary exposure to the 120-dB threshold should require aerial survey monitoring. In the past, applicants have resisted aerial surveys in the Chukchi Sea based on the perceived dangers. This assertion should be reviewed in light of the multiple aerial surveys that are now being conducted there: COMIDA survey flights are now routine over the Chukchi and Shell is relying on aerial reconnaissance for

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[107] *See Natural Res. Def. Council*, 279 F. Supp. 2d at 1159 (noting that the language imposes a "stringent" standard).
[108] 16 U.S.C. § 1371(a)(5)(D)(III). NMFS should also require that any resulting monitoring data should be made freely available to the public.
[109] NMFS has previously warned that "[s]pecial precautions should be taken" to ensure that any spilled oil does not reach areas in or near the spring lead system, the fall migration corridor, or whale feeding areas. 2008 BiOp at 116-17.
[110] 76 Fed. Reg. at 69,978. Not only are bowhead whales more constrained by the lead system during the spring migration, but studies also indicate that "most calving occurs during the spring migration when whales are in the Chukchi Sea." 2008 BiOp at 10. NMFS should further examine the potential impacts of a major 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.
[111] 75 Red. Reg. at, 77,509.
[112] *See* 72 Fed. Reg. 17,864, 17,870 (Apr. 10, 2007) (proposed drilling IHA); 2007 FONSI at 3-4.
[113] *See* 2006 PEA at 110-111 (noting sensitivity of baleen whale cow-calf pairs and as well as potential effects when key habitat is affected).

confirmation of ice conditions during its drilling.[114] Indeed, Shell itself will implement an aerial monitoring program extending 37 kilometers from the shore, as it has in a number of years when conducting offshore exploration activities.[115]

Finally, NMFS should consider a waste disposal alternative similar to that which Shell intends to employ in the Beaufort Sea to avoid any unnecessary effects to marine mammals, their habitat, or prey species.

G. Subsistence

The MMPA also requires that any incidental take authorized will not have "an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives.[116] NMFS must ensure that Shell's activities do not reduce the availability of any affected population or species to a level insufficient to meet subsistence needs.[117] In addition to the issues already noted in these comments, NMFS should 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. The importance of marine mammals to coastal communities strongly favor a precautionary approach.[118]

II. COMPLIANCE WITH OTHER LAWS

A. National Environmental Policy Act

NMFS indicates that it is preparing an environmental assessment pursuant to the National Environmental Policy Act (NEPA) but makes no mention of its long-standing effort to develop a programmatic review of oil and gas exploration. In 2006, NMFS acknowledged the potential for cumulative, longer-term impacts to marine mammals resulting from expanded oil and gas activity in the Arctic. As a consequence, NMFS and BOEM's predecessor committed to address the issue, in part, by preparing a programmatic environmental impact statement (EIS) in order to assess seismic survey permitting throughout the Beaufort and Chukchi seas.[119] That effort resulted in a 2009 draft EIS, but before it was finalized, the agencies announced that additional information had become available, in particular, "renewed interest in exploratory drilling in both the Chukchi and Beaufort Seas[.]"[120] A new process was then initiated with NMFS announcing in 2010 its intent to prepare an EIS to analyze the environmental impacts of issuing take authorizations incidental to all exploration activities, including both seismic surveys and exploratory drilling.[121]

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[114] 76 Fed. Reg. at 69,960.
[115] *Id*. at 69,987. The 2010 Open Water Meeting expert panel included a number of comments related to appropriate aerial monitoring. 2010 Expert Panel Review at 4-5.
[116] 16 U.S.C. § 1371(a)(5)(D)(i)(II).
[117] 50 C.F.R. § 216.102.
[118] *See* 50 C.F.R. § 216.104(c) (requiring best available science standard for subsistence finding).
[119] 71 Fed. Reg. 66,912 (Nov. 17, 2006).
[120] 74 Fed. Reg. 55,539 (Oct. 28, 2009).
[121] 75 Fed. Reg. 6,175 (Feb. 8, 2010).

As our groups have repeatedly brought to NMFS's attention, NEPA regulations make clear that agencies should not proceed with authorizations for individual projects like the Shell drilling proposals until an ongoing programmatic EIS is complete.[122] Shell's Arctic plans are unprecedented in scope, with two drilling fleets operating simultaneously in both seas over multiple years, resulting in 10 new exploration wells. The project will include seismic surveys and likely some degree of ice breaking and management. It would be unlawful for NMFS to approve the marine mammal harassment associated with Shell's proposal without completing the EIS. Only by evaluating as a whole the cumulative, long-term impacts of noise associated with expanding levels of seismic exploration and exploratory drilling can the full and potentially synergistic effects of the various individual projects be understood and adequately protective mitigation measures put in place.[123]

B. Endangered Species Act

The proposed IHA indicates that NMFS will initiate self-consultation for three listed marine mammal species.[124] NMFS, however, should not overlook bearded and ringed seals in its consultation. Portions of their populations have been proposed for listing, and those decisions will be finalized long before Shell proposes to begin its drilling program.[125] NMFS must also reconsider the potential effects of a major oil spill. The recent 2010 biological opinion for Shell's Arctic surveying did not independently consider the effects of an oil spill, instead relying on the analysis contained in its 2008 regional biological opinion.[126] That approach would be inappropriate here. NMFS's 2008 review lacks a site-specific oil spill analysis based on the known parameters of Shell's existing proposal. With Shell's proposed drilling to take place in the whales' migration corridor, during a period that will overlap with the fall migration, and proximate to the spring lead system (were a spill to overwinter), the 2008 biological opinion's conclusions as to the potential for harm must be reconsidered. Further, the difficulties in mounting an effective spill response have been starkly illustrated by the Gulf of Mexico disaster and should be taken into account as applied to the Arctic, a considerably more remote and more challenging environment in which to operate.[127]

Thank you for considering these comments, and we look forward to working with you in the future on this important issue.

Cindy Shogan
Executive Director
ALASKA WILDERNESS LEAGUE

Eric F. Myers
Policy Director
AUDUBON ALASKA

Rebecca Noblin
Alaska Director
CENTER FOR BIOLOGICAL DIVERSITY

Sierra Weaver
Senior Staff Attorney
DEFENDERS OF WILDLIFE

[122] *See* 40 C.F.R. § 1506.1(c).
[123] The EIS may also illuminate issues such as necessary mitigation measures and important time and place restrictions.
[124] 76 Fed. Reg. at 70,007.
[125] *See* 75 Fed. Reg. at 77,476 (ringed); 75 Fed. Reg. at 77,496 (bearded).
[126] 2010 BiOp at 2.
[127] 75 Fed. Reg. at 77,509.

Michael Mayer
Attorney
EARTHJUSTICE

Charles M. Clusen
Alaska Project Director
NATURAL RESOURCES DEFENSE COUNCIL

Pamela A. Miller
Arctic Program Director
NORTHERN ALASKA ENVIRONMENTAL CENTER

Andrew Hartsig
Director, Arctic Program
OCEAN CONSERVANCY

Susan Murray
Senior Director, Pacific
OCEANA

Shawna Larson
Alaska Program Director
PACIFIC ENVIRONMENT

Faith Gemmill
Executive Director
REDOIL

Dan Ritzman
Alaska Program Director
SIERRA CLUB

Lois N. Epstein, P.E.
Engineer & Arctic Program Director
THE WILDERNESS SOCIETY

Layla Hughes
Senior Program Officer for Arctic Oil, Gas, and Shipping Policy
WORLD WILDLIFE FUND

Exhibit 1

Comments on Shell's Planned Exploratory Drilling Program in the Chukchi Sea, Alaska
By Dr. David Bain

Comments on Shell's Planned Exploratory Drilling Program in the Chukchi Sea, Alaska
By Dr. David Bain

I am submitting this statement regarding the proposed exploration drilling program in the Chukchi Sea. I received my B.A. with majors in Biology and Psychobiology with Physics in 1980 and Ph.D. in Biology in 1989 from the University of California at Santa Cruz. I have authored over 30 peer-reviewed papers and reports on the behavioral ecology of marine mammals, especially of killer whales (*Orcinus*). A substantial portion of this work has been concerned with audition, sound production, and other aspects of the acoustic ecology of these species. I have conducted studies for the National Marine Mammal Laboratory and other branches of the National Marine Fisheries Service, Minerals Management Service, and U.S. Geological Survey on the impacts of acoustic disturbance on individuals and populations of marine mammals. Reports based on these and other disturbance related studies have been published in books and peer-reviewed journals and presented at scientific meetings of the International Whaling Commission, the Society for Marine Mammalogy, and the Acoustical Society of America. I have reviewed Shell's exploration plan, incidental harassment authorization application (IHA), the environmental impact assessment, and related documents.

General Comments

Uncertainties and incorrect assumptions

NMFS' analysis of the effects of the proposed project is inadequate because it makes assumptions to deal with uncertainties. In many cases, the assumptions are contradicted by data. For example, NMFS makes assumptions about the source level of ice-breaker noise and how efficiently it will propagate. It assumes that belugas will only be impacted if the received level is 120 dB or above. However, belugas are known to react strongly to ice-breaker noise at 80 km. According to the equation NMFS used in its analysis, the received level would have been -9.6 dB. Clearly, either the propagation model is wrong, the threshold for effects is wrong, or more likely, both are wrong.

NMFS also makes assumptions about how loud the drill ship will be. However, received levels can vary with depth, so measurements based on a single measurement location are minimum estimates, not best estimates.

Another important incorrect assumption NMFS makes is that marine mammals don't move. That is, it calculates how many marine mammals will be impacted when the equipment is turned on, but fails to consider that day-to-day movements, not to mention migration, will cause many more individuals to approach and be impacted by the noise source.

NMFS makes assumptions about stock status. However, in some cases it lacks the data needed to determine what magnitude of observable short-term effect will impact the stock. I will address these and other issues in more detail below.

Types of effects

Noise exposure is likely to result in stress. Stress can impair the immune system, resulting in an increase in mortality from disease (Rolland, R. M., P. K. Hamilton, S. D. Kraus, B. Davenport, R. M. Gillett, and S. K. Wasser. 2006. Faecal sampling using detection dogs to study reproduction and health in North Atlantic right whales (*Eubalaena glacialis*). J. Cetacean Res. Manage. 8:121–125 and Romano, T. A., M. J. Keogh, C. Kelly, P. Feng, L. Berk, C. E. Schlundt, D. A. Carder and J. J. Finneran. 2004. Anthropogenic sound and marine mammal health: measures of the nervous and immune systems before and after intense sound exposure. Can J. Fish. Aquat. Sci. 61:1124-1134).

The noise associated with drilling and drilling support will likely divert whales and porpoises away from this area. The diversion around the drill sites will require greater energy expenditure. Species-specific deflection data will be discussed separately for each species below.

Prey densities far above average are needed to support feeding. That is, the shift of feeding areas from locations with high prey density to areas with low prey density will reduce food intake. There is no basis for an assumption that displacement to another part of the range would be harmless.

Taken together, loss of feeding and resting opportunities and an increase in travel distance will impair the energy balance of affected individuals (*see* Bain, D. E. 2002. A model linking energetic effects of whale watching to in killer whale (*Orcinus orca*) population dynamics. Contract report submitted to Orca Relief Citizens' Alliance).

Correcting for source level and propagation conditions

Hall et al. found a 15 dB difference in source level for the Kulluk depending on whether they based their calculations on received levels at 10 or 20 m below the surface (Hall, J. D., M. L. Gallagher, K. D. Brewer, P. R. Regos and P. E. Isert. 1994. 1993 Kuvlum exploration area site specific monitoring program. Coastal & Offshore Pacific Corporation. Walnut Creek, CA. 219 pp.). This illustrates the magnitude of uncertainty of source levels based on single measurement locations. The source level measurements for the Discoverer were made only with bottom mounted hydrophones (Austin, M., Warner, G. 2010. Acoustic monitoring of the Drillship Frontier Discoverer. Technical Report prepared by JASCO Applied Sciences, Victoria,

BC, Canada, for Shell International Exploration and Production Inc. 45 pp.). Thus they might not have captured the strongest beams from the Discoverer.

In addition, noise sources not directly associated with drilling, such as thrusters at over 190 dB, have higher source levels and energy at frequencies that will propagate efficiently, though it is not clear from the IHA application how often they would be used. These other considerations may result in a significant increase in the ensonified area.

Replicate measurements of the same source at similar depths can produce different results. Both Greene (Greene, C. R., Jr. 1987. Characteristics of oil industry dredge and drilling sounds in the Beaufort Sea. J. Acoust. Soc. Am. 82:1315-1324) and Hall et al. measured the conical drilling unit Kulluk. Greene found the 120 dB contour at about 10 km, while Hall et al. measured over 130 dB at 75 km. Among other factors, it is likely that propagation conditions were different.

Sound propagation efficiency depends on conditions. The modeling used by Shell does not capture the most efficient mode of propagation. The model relies on GDEM data, which produces a single profile for each month (Warner, G. and D. Hannay. 2011. Acoustic modeling of underwater noise from the Frontier Discoverer in the Chukchi and Beaufort Seas. Version 1.0. Technical report for Shell Exploration and Production Company by JASCO Applied Sciences). However, Chu et al. (Chu, P. C., Q. Wang, and R. H. Bourke. 1999. A geometric model for the Beaufort/Chukchi sea thermohaline structure. J. Atmos. Oceanic Tech. 16:613-632) found three discrete types of salinity temperature profiles that occur commonly in the shallow portion of the northern Chukchi Sea. In approximately 20% of the summer-fall data reviewed, the water column was well mixed from surface to bottom. However, in the other ~80% of records, only a portion of the water column near the surface was mixed. The depth of this mixed layer and the amount of fresh water and ice present will alter sound propagation patterns. Necessarily, the GDEM model only captures one of the profiles, and misses variability within each profile. The correction factor of 1.5 applied to the distance to the 120 dB contour is inadequate to conservatively account for the variability.

When multiple sources are involved, such as an ice management vessel and drill ship, accurate characterization of the sound fields will be necessary to determine whether their sound fields overlap and whether marine mammals are likely to deflect around one or both sources.

NMFS should perform a sensitivity analysis using a variety of propagation conditions.

Correcting for thresholds

Further, as will be made clear below, marine mammals in general and harbor porpoises in particular respond to noise at levels far below 160 dB and even below 120 dB. Thus implications of takes must be considered at far lower received levels of noise, which will occur

over much larger areas, and hence affect much greater numbers of individuals than anticipated by the applicant.

Correcting for movement

The proposed IHA uses density as the basis for its calculation of the numbers of individuals to be exposed to noise. That is, the model only calculates the number of individuals affected at a given moment. However, this approach is only appropriate for brief activities or when marine mammals are stationary compared to the noise source. Neither assumption applies in this case. In practice, noise will be continuous for months and bowheads and belugas will migrate through the ensonified area.

It should be recognized that there is a continuum of movement on both the part of marine mammals and noise sources, e.g., drilling platforms are stationary, while airgun arrays are always on the move, and ships tend to move faster still. Some marine mammals have small home ranges, while others migrate past a noise source and would only have one chance to be exposed. The fall bowhead migration and drilling are at ends of both continua, but Shell's model is at the wrong end of the whale movement continuum, so it is as far off as possible. Similarly, beluga takes are likely to be severely underestimated for this reason.

In addition, Shell's model will also underestimate effects on non-migrating marine mammals. In the summer, marine mammals are moving throughout the Chukchi Sea. Since feeding, mating, and other behavior typically involves non-directional travel, a smaller number of new animals are likely to enter the ensonified area each day than during migration. However, due to the many days in the drilling season prior to migration, many more harbor porpoises, belugas, and bowheads could be affected than predicted by Shell's model

Bowheads

The drill sites are central to the migration route of bowhead whales

Bowhead whales are a slow growing species (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.). Impairing the energy balance will slow growth further. In turn, this will lead to delayed onset of sexual maturity. A consequence of this will be reduced recruitment of calves to the population.

Lactation requires approximately twice as much energy expenditure by new mothers than by non-reproductive females (Oftedal, O.T. 1997. Lactation in whales and dolphins: evidence of divergence between baleen- and toothed-species. J. Mammary Gland Biol. Neoplasia 2:205-30). As a result, bowheads spend years storing the energy needed to reproduce successfully.

Impairing the energy balance will increase the interval between successful calf recruitment (Lockyer, C. 1984. Review of baleen whale (*Mysticeti*) reproduction and implications for management. Rep. Int. Whal. Commn (Spec. Iss. 6):27-50). In turn, this will result in a reduction in the number of calves recruited to the population.

Bowheads are a long-lived species, with some individuals living well over 100 years (George, J. C., J. Zeh, R. Suydam and C. Clark. 2004. Abundance and population trend (1978-2001) of Western Arctic bowhead whales surveyed near Barrow, Alaska. Marine Mammal Science, 20(4):755-773). Such a long lifespan requires successfully overcoming disease. Many diseases inhibit feeding until the immune system overcomes the infection.

To survive a period of non-feeding, individuals must have an adequate blubber layer. Impaired energy balance reduces the probability that an individual will survive an infection. In turn, this would lead to additional mortalities in the population. Further, females who die young will not produce as many calves as they would have if they lived a normal lifespan.

The distance at which individuals will avoid the drill sites will vary with a number of factors. How much noise drilling operations will make will vary with conditions. In particular, managing ice requires production of high levels of noise (Richardson, W. J., Jr. C.R. Green., R. Malme and C. I. Thomson. 1995. Marine mammals and noise. Academic Press. San Diego).

Hearing loss from exposure to high levels of noise in the past, or ongoing anthropogenic masking noise at levels above the natural ambient, would impair bowhead whales' ability to hear vocalizations. Vocalizations are important for maintaining social cohesion with potential mates, and mating sometimes occurs during the fall migration (National Marine Fisheries Service. 2008. Endangered Species Act - Section 7 Consultation; Biological Opinion; Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the Marine Mammal Protection Act. 140 pp.). Failure to find mates could result in a reduction in calf recruitment. Echoes from vocalizations are likely to provide important information on ice thickness. (Ellison, W.T., C. W. Clark, and G. C. Bishop. 1987. Potential use of surface reverberation by bowhead whales, *Balaena mysticetus*, in underice navigation: preliminary considerations. Report of the International Whaling Commission 37:329-332.). Failure to correctly assess ice thickness could result in an increase in mortality.

Predators can be detected at greater distances acoustically than visually by healthy individuals. Hearing loss and masking would increase vulnerability to predation, which in turn could increase mortality. Hearing loss and masking may also increase vulnerability to ship strike.

Cumulative effects are of further concern. "The accumulation of impacts from vessels, seismic exploration, and drilling are of concern across the North Slope of Alaska," (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer.,

NOAA Tech. Memo. NMFSAFSC-223, 292 p.). That is, when looking at the biological impact on bowhead whales, drilling in the Chukchi Sea cannot be considered separately from other planned activities, including similar activities by Shell in the Beaufort Sea, as well as work proposed by other companies, such as ConocoPhillips and Statoil. The Chukchi Sea sites are in a location where the migration corridor is widening (see Moore, S. E., D. P. DeMaster, and P. K. Dayton. 2000. Cetacean habitat selection in the Alaskan Arctic during summer and autumn. Arctic. 53:432– 447). Although this will allow bowheads to give a wider berth to drilling activities, the area is used by calves in their first year of life, the members of the population most vulnerable to harm from disturbance (Koski, W.R., R.A. Davis, G.W. Miller, and D.E. Withrow., 1993. Reproduction. *In: The Bowhead Whale,* J.J. Burns, J.J. Montague and C.J. Cowles, eds. Special Publication of The Society for Marine Mammalogy, 2. Lawrence, KS: The Society for Marine Mammalogy, pp. 239-274).

Drilling in both seas over multiple years is likely to result in a higher fraction of the population being exposed to disturbance, some individuals being exposed multiple times for a longer total period of time, and a possible increase in stress due to repeated exposure. Further, if exploratory drilling results in future production, the cumulative effect of production in the core of the migration route needs to be considered.

Cumulative effects on the population are likely to increase at a steeper than linear rate. That is, doubling exposure to disturbance is likely to more than double population level effects such as reductions in fecundity and increases in mortality (Bain, D. E. 2002. A model linking energetic effects of whale watching to in killer whale (*Orcinus orca*) population dynamics. Contract report submitted to Orca Relief Citizens' Alliance).

The number of individuals that would be added to the population in the absence of disturbance can be estimated using the equation:

$$\Delta N / \Delta t = rN(1-(N/K)^{\theta}),$$

where N is the current population size, K is the carrying capacity, r is the intrinsic rate of increase (i.e., the rate at which the population would grow in the absence of intraspecific competition), and θ is a shape parameter that specifies how population consequences of intraspecific competition vary with population size (Olesiuk, P. F., G. M. Ellis and J. K.B. Ford. 2005. Life History and Population Dynamics of Northern Resident Killer Whales (*Orcinus orca*) in British Columbia. CSAS Research Document 2005/045. 1-81).

Excluding whales from feeding areas effectively reduces K. In turn, this reduces the rate of population increase. This is equivalent to removing individuals from the population. Clarke and Ferguson noted that feeding occurred in the Chukchi Sea during the summer and during the fall migration (Clarke, J. T. and M. C. Ferguson. 2010. Aerial surveys of large whales in the northeastern Chukchi Sea, 2008-2009, with review of 1982-1991 data. Report to the IWC Scientific Committee *SC/62/BRG13. 18 pp.).*

Excluding whales from resting areas and extending migratory routes require individuals to expend more energy. Thus they need to eat more to survive. This effectively increases the amount of intraspecific competition, and hence reduces K. In turn, this reduces the rate of population increase. This is equivalent to removing individuals from the population. When the shape parameter is 1, the per capita growth rate peaks when the population is at 50% of carrying capacity.

However, for marine mammals, the shape parameter tends to be large. That is, intraspecific competition does not become important until the population size is closer to carrying capacity than 50%. However, intraspecific competition becomes much more important near carrying capacity when the shape parameter is large than when it is small.

As a result, a population that grows in the presence of disturbance is not a sign that disturbance is unimportant. Rather, depleted populations are capable of some growth in conditions that are obviously harmful to populations near carrying capacity (Bain, D. E. 2002. A model linking energetic effects of whale watching to in killer whale (*Orcinus orca*) population dynamics. Contract report submitted to Orca Relief Citizens' Alliance).

Bowheads may be near carrying capacity now, although they would have been depleted when the population was still growing in the presence of disturbance (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.).

That is, the depleted population was capable of growth in the presence of disturbance in the 1990s, but an increase in disturbance to the population now, while it appears to be near carrying capacity, could result in slowed growth or a loss of individuals.

This analysis suggests that there will be little difference in the effect on the population regardless of whether many individuals are affected a small number of times or a small number of individuals are affected many times or for a prolonged period of time.

The relative degree of exposure among individuals determines which individuals are likely to bear the burden of the population scale effects. That is, individuals extensively affected are less likely to be able to overcome the impact, whereas individuals little affected are more likely to be able to overcome the impact at the expense of non-exposed individuals as they more aggressively try to obtain the additional resources needed to offset short-term effects.

Individuals within a population near carrying capacity are more likely to die or experience reduced reproduction than individuals in populations well below carrying capacity, when exposed to disturbance (Bain, D. E. 2002. A model linking energetic effects of whale watching to in killer whale (*Orcinus orca*) population dynamics. Contract report submitted to Orca Relief Citizens' Alliance).

That is, individuals in this bowhead population are quite vulnerable to harm from disturbance due to the proposed drilling project. For reasons specified in this statement, the number of individuals likely to be affected merits reconsideration using different methods than those in the proposed IHA.

The proposed IHA uses density as the basis for its calculation of the numbers of individuals to be exposed to noise, but as mentioned above, the calculation needs to be corrected for movement. To correct for movement, the boundary of the ensonified area needs to be identified

The next step is to determine the number of individuals that would migrate past the drill sites during the drilling season. Individuals that start close enough to the drilling area to reach it by the end of the drilling are candidates to be affected. However, only those whose course will pass through the ensonified area will actually be affected. That is, the whales in an area that is as long as the distance they will migrate during the remainder of the drilling season and as wide as the diameter of the ensonified area approximates the number that will actually be affected when movement is taken into account. In essence, new whales will be exposed to noise as they approach the noise source. Rather than estimating takes based on the number of whales in the ensonified area at any given instant, it is more appropriate to draw a line across the ensonified area and estimate the number of individuals that would be expected to cross that line during the activity. Using a density calculation without taking movement into account artificially reduces the number of bowheads that will likely be affected (see Figure 1).

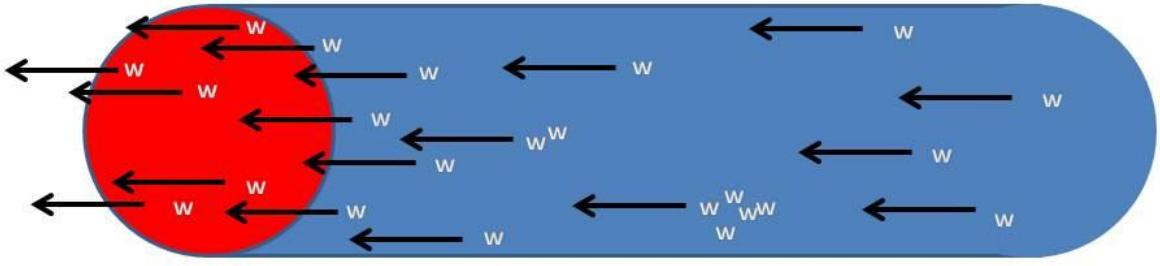

Figure 1. Schematic showing effects of migration on the number of whales exposed to noise. Red area shows where whales would be exposed at any given instant. W's represent initial whale positions. Arrows show direction of migration. They also indicate the distance that will be traveled in one day. This figure indicates that approximately 5 whales will be exposed at any given instant, but that an additional 5 whales will be exposed each day. Whales starting outside the blue or red areas would not be exposed.

The number of whales affected outside the migration season will also be underestimated (see Figure 2), even though movement is not as directional as during migration.

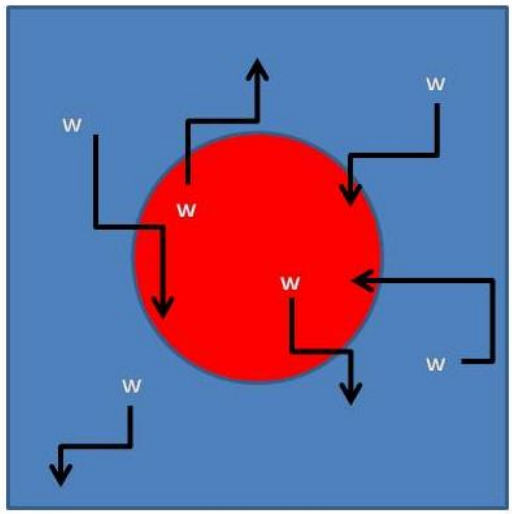

Figure 2. Schematic showing effects of non-directional movement on the number of whales exposed to noise. Red area shows where whales would be exposed at any given instant. W's represent initial whale positions. Arrows show paths of movement. Note that some nearby whales will be exposed to noise later in the season than those exposed at the start.

In addition, only individuals within the 120 dB contour were considered subject to harm by Shell in its materials. In fact, lower levels of noise have been shown to deflect migrating bowheads and exclude them from habitat (Miller, G. W., R. E. Elliott, W. R. Koski, V. D. Moulton and W. J. Richardson. 1999. Whales. In W. J. Richardson (ed.) Marine mammal and acoustical monitoring of Western Geophysical's open-water seismic program in the Alaskan Beaufort Sea, 1998. LGL Rep. TA2230-3. LGL Ltd. King City, Ontario. 390 pp.).

There is greater concern when cow-calf pairs are affected. A review of the BWASP database confirms that some cow-calf pairs pass through the drill sites during the migration (http://www.alaska.boemre.gov/ess/bwasp/xbwasp.htm, downloaded August 22, 2011) The data also confirm that the drill sites can be used for resting, although other areas may be of comparable quality for that purpose.

The tendency of some bowheads to travel in groups (Moore, S. E., D. P. DeMaster, and P. K. Dayton. 2000. Cetacean habitat selection in the Alaskan Arctic during summer and autumn. Arctic. 53:432– 447) means that if a group approaches a drill site, the density will be far higher than estimates based on individual density. That is, the maximum number of takes could easily be underestimated, even if the best estimate is accurate.

The increase in vessel traffic associated with this project increases the risk of ship strike. Bowheads are known to be struck by ships (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223,

292 p.), and ship strike has become a leading source of mortality in the closely related North Atlantic Right Whale (Waring GT, Josephson E, Fairfield-Walsh CP, Maze-Foley K, editors. 2009. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2008. NOAA Tech Memo NMFS NE 210; 440 pp.).

The recovery of the Bering-Chukchi-Beaufort stock (BCBS) is in contrast to the recovery of other stocks. There is no quantitative evidence that other bowhead stocks have increased, although data are limited (Reilly, S.B., Bannister, J.L., Best, P.B., Brown, M., Brownell Jr., R.L., Butterworth, D.S., Clapham, P.J., Cooke, J., Donovan, G.P., Urbán, J. & Zerbini, A.N. 2008. *Balaena mysticetus*. In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <www.iucnredlist.org>. Downloaded on 28 November 2011**)**.

The Sea of Okhotsk stock may have been exposed to excessive harvest as part of illegal Soviet whaling. All stocks face potential impact from entanglement, vessel collisions, and disturbance (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.).

Maintaining the BCBS bowheads is the best way to ensure survival of the species as a whole. Protecting them from expanding threats such as oil exploration and drilling, and the associated activities that may have limited the recovery of other stocks, are important steps in sustaining this species.

In summary, effects on the bowhead stock have been underestimated for a variety of reasons. The number of individuals taken at a given moment is the area exposed multiplied by density, but area has been underestimated. The area in which takes are likely to occur will be larger than estimated in the IHA because: 1) the source level estimate for the Discoverer is a minimum estimate; 2) sound will propagate more efficiently than anticipated much of the time; and 3) the threshold for bowhead whales to be taken can be much lower than 120 dB. Moreover, due to the duration of the project, bowheads not initially exposed will have time to move to the ensonified area over the course of the drilling season. In particular, bowheads will migrate through the drilling area. Until the magnitudes of these effects are determined, and other uncertainties like population size relative to carrying capacity are resolved, NMFS cannot adequately assess the potential for adverse effects on this species. Hence it cannot conclude the species will not be harmed.

Gray whales

Gray whales use Hanna Shoal, which is located near the drill sites, for feeding.

Gray whales were taken off the endangered species list in 1994. The population peaked in 1988, then crashed, and began to increase again through 1998 followed by a second population crash in 1999-2000, with starvation a likely cause (Allen, B. M., and R. P. Angliss. 2011. Alaska

marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.). It is possible that the population exceeded carrying capacity. (Minerals Management Service, Chukchi Sea Planning Area Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea, Final Environmental Impact Statement at III-79 (May 2007).

It appears that when inadequate prey are available, mortality increases and recruitment decreases. Prey availability can be reduced by over-feeding, as it takes years for local prey populations to recover. It can also be reduced when ice cover precludes access to feeding grounds (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.).

Gray whale movement is known to be affected by noise levels of 120 dB. (W.J. Richardson et al., Marine Mammals and Noise (Academic Press 1995)). It should be pointed out that 120 dB is the level at which there is 50% probability of response. That is, half the population responds to levels below 120 dB. With the proximity of the drill sites to Hanna Shoal, drilling and associated ice management activity may preclude gray whale access to this feeding area. This would be analogous to exclusion by ice, with potential for analogous increases in mortality and reduction in calf recruitment.

In summary, effects on the gray whale stock have been underestimated for a variety of reasons. The number of individuals taken at a given moment is the area exposed multiplied by density, but area has been underestimated. The area in which takes are likely to occur will be larger than estimated in the IHA because: 1) the source level estimate for the Discoverer is a minimum estimate; and 2) sound will propagate more efficiently than anticipated much of the time. Moreover, due to the duration of the project, gray whales not initially exposed will have time to move to the ensonified area over the course of the drilling season. Until the magnitudes of these effects are determined, and other uncertainties like population size relative to carrying capacity are resolved, NMFS cannot adequately assess the potential for adverse effects on this species. Hence it cannot conclude the species will not be harmed.

Belugas

Belugas also occur near the drilling sites during summer and autumn.

Like bowheads, belugas rely on hearing for navigation, communication, and avoiding predation. In addition, belugas use echolocation to find prey (Au, W. W. L. 1993. The sonar of dolphins. Springer-Verlag, New York. 277 pp.). That is, masking of echolocation signals by noise, temporary threshold shifts, and permanent threshold shifts will impair the ability of belugas to find food. This mechanism for harm is in addition to impaired ability to find food due to displacement from high quality feeding areas (Southall, B.L., A. E. Bowles, W.T. Ellison, J. J. Finneran, R. L. Gentry, C. R. Greene Jr., D. Kastak, D. R. Ketten, J. H. Miller, P. E.

Nachtigall, W. J. Richardson, J. A. Thomas, P. L. Tyack. 2007. Criteria for behavioral disturbance. Aquatic Mammals. 33:446-473 and Finneran, J. J., C. E. Schlundt, R. Dear, D. A. Carder and S. H. Ridgway. 2002. Temporary shift in masked hearing thresholds in odontocetes after exposure to single underwater impulses from a seismic watergun. J. Acoust. Soc. Amer. 111:2920-2940).

Belugas are known to be disturbed by icebreaker noise 80 km away (National Research Council. 2003. Ocean noise and marine mammals. National Academies Press. Washington, DC. 192 pp.), a point particularly important here due to high densities of belugas near the drill site in fall. (*see* Moore, S. E., D. P. DeMaster, and P. K. Dayton. 2000. Cetacean habitat selection in the Alaskan Arctic during summer and autumn. Arctic. 53:432– 447). Belugas begin to show responses at received levels that are likely to be barely audible, in the range of 94-105 dB (Norman, S. A. 2011. Nonlethal anthropogenic and environmental stressors in Cook Inlet beluga whales (*Delphinapterus leucas*). Report prepared for NOAA Fisheries, NMFS, Anchorage, AK. Contract HA133F-10-SE-3639. 113 p.).

Masking of communication signals is also likely to be a problem at this distance. Although beluga communication signals contain high-frequency components that are less vulnerable to masking by low frequency noise than low-frequency components, the high-frequency components are directional and attenuate faster than low-frequency components. That is, the omni-directional low-frequency component used for long distance communication among widely spaced belugas is vulnerable to masking (*see* Miller, P. J. O. 2006. Diversity in sound pressure levels and estimated active space of resident killer whale vocalizations. J. Comp. Physiol. A Neuroethol Sens. Neural Behav. Physiol. 192:449-59 and Bain, D. E. and M. E. Dahlheim. 1994. Effects of masking noise on detection thresholds of killer whales. In (T. R. Loughlin, ed.) Marine Mammals and The Exxon Valdez. Academic Press. N.Y. 243-256).

Work will be underway while belugas are nursing (O'Corry-Crowe, G. (2002). "Beluga Whale *Delphinapterus leucas*". in Perrin, W., Würsig B. and Thewissen, J. *Encyclopedia of Marine Mammals*. Academic Press. p. 94–99). Beluga females are likely to require two to four times as much food while lactating to successfully rear a calf than while pregnant (Oftedal, O.T. 1997. Lactation in whales and dolphins: evidence of divergence between baleen- and toothed-species. J. Mammary Gland Biol. Neoplasia 2:205-30 and see Bain, D. E., and J. Olhiser. 1994. Factors affecting food intake of killer whales and dolphins. Paper presented to the International Marine Animal Trainers Association Conference. Tacoma, WA). Belugas cannot store sufficient blubber to successfully rear calves when food intake is reduced.

In addition to lactation, wake riding is an important mechanism for transferring energy from the mother to a calf. The energetic cost of this increases dramatically with increased swimming speed as may occur in the event of flight from disturbance.

As with bowheads, belugas will be migrating past the drill site in the fall. Thus, the numbers taken should be based on the number reaching the ensonified area over the course of the drilling season, not the number affected at any given moment.

Population censuses of the Eastern Chukchi and Beaufort stocks of belugas have not been conducted in the last 10 years. Therefore, population trends are unknown. In contrast to bowheads, no evidence of population growth was seen when censuses were still being conducted (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.).

In summary, effects on the beluga stock have been underestimated for a variety of reasons. The number of individuals taken at a given moment is the area exposed multiplied by density, but area has been underestimated. The area in which takes are likely to occur will be larger than estimated in the IHA because: 1) the source level estimate for the Discoverer is a minimum estimate; 2) sound will propagate more efficiently than anticipated much of the time; and 3) the threshold for belugas to be taken can be as low as 94-105 dB. Moreover, due to the duration of the project, belugas not initially exposed will have time to move to the ensonified area over the course of the drilling season. Likewise, migrating belugas will approach the ensonified area. Until the magnitudes of these effects are determined, and other uncertainties like population trends are resolved, NMFS cannot adequately assess the potential for adverse effects on this species. Hence it cannot conclude the species will not be harmed.

Harbor Porpoises

Harbor porpoises are of special concern because they are among the most sensitive marine mammal species to disturbance. Olesiuk *et al.* (Olesiuk, P.F., L. M. Nichol, M. J. Sowden, J. K. B. Ford. 2002. Effect of the sound generated by an acoustic harassment device on the relative abundance and distribution of harbour porpoises (*Phocoena phocoena*) in Retreat Passage, British Columbia. Mar. Mamm. Sci. 18:843-862) found noise from acoustic harassment devices with a source level of 195 dB excluded 95% of harbor porpoises within a radius of 3 km (individuals may have been kept farther away, but porpoises are difficult to see at all beyond that range), where received levels probably dropped below 135 dB.

Behavioral changes, including exclusion from an area, can occur at received levels from 90-110 dB re 1 µPa or lower. Porpoises avoid pingers with source levels of about 130 dB at distances of from 100-1000 m (received levels around 70-90 dB), depending on experience with the noise source and environmental context (Bain, D. E. 2002. Acoustical properties of pingers and the San Juan Island commercial gillnet fishery. NMFS Contract Report No. 40ABNF701651. 14 pp.; Barlow, J. and G. A. Cameron. 1999. Field experiments show that acoustic pingers reduce marine mammal bycatch in the California drift gillnet fishery. Paper IWC SC/S1/SM2. 20 pp.; Cameron, G. 1999. Report on the effect of acoustic warning devices (pingers) on cetacean and pinniped bycatch in the California drift gillnet fishery. NMFS Contract

Report No. 40JGNF900207; Cox, T. M., A. J. Read, A. Solow and N. Trengenza. 2001. Will harbour porpoises (*Phocoena phocoena*) habituate to pingers? J. Cet. Res. Manage. 3:81-86; Gearin, P. J., M. E. Gosho, L. Cooke, R. Delong, J. Laake and D. Greene. 1996. Acoustic alarm experiment in the 1995 Northern Washington Marine Setnet Fishery. NMML and Makah Tribal Fisheries Management Division Report; Gearin, P. J.; Gosho, M. E.; Laake, J. L.; Cooke, L. Delong, R. L.; Hughes, K. M. 2000. Experimental testing of acoustic alarms (pingers) to reduce bycatch of harbour porpoise, *Phocoena phocoena*, in the state of Washington. Journal of Cetacean Research and Management. 2: 1-10; Kraus, S. D., A. J. Read, A Solow, K. Baldwin, T. Spradlin, E. Anderson & J. Williamson. 1997. Acoustic alarms reduce porpoise mortality. Nature. 388:525; Laake, J. L., P. J. Gearin and R. L. DeLong. 1999. Further evaluation of harbor porpoise habituation to pingers in a set gillnet fishery. AFSC Processed Rep. 99-08; Laake, J. L., P. J. Gearin, M. E. Gosho and R. L. DeLong. 1997. Evaluation of effectiveness of pingers to reduce incidental entanglement of harbor porpoise in a set gillnet fishery. In (P. S. Hill and D. P. DeMaster, eds.) MMPA and ESA implementation program, 1996. AFSC Processed Report 97-10. 75-81; Laake, J., D. Rugh and L. Baraff. 1998. Observations of harbor porpoise in the vicinity of acoustic alarms on a set gill net. NOAA Tech. Memo. NMFS-AFSC-84.

Kastelein *et al.* found behavioral responses to even lower levels. (Kastelein, R. A., D. de Hahn, A. D. Goodson, C. Staal and N. Vaughan. 1997. The effects of various sounds on a harbour porpoise *Phocoena phocoena*. The Biology of the Harbour Porpoise. Woerden, the Netherlands. De Spil Publishers.; and Kastelein, R. A., D. de Hahn, N. Vaughan, C. Staal and NM Schooneman. 2001. The influence of three acoustic alarms on the behavior of harbour porpoises (*Phocoena phocoena*) in a floating pen. Mar. Enviro. Res. 52:351-371). That is, porpoises are likely to exhibit short-term (weeks) exclusion to the 70 dB contour, and after some additional habituation, will remain outside the 90 dB contour throughout the drilling period. However, harbor porpoises are unlikely to habituate to ice management noise.

While it is possible that distance as well as received level should be considered when predicting whether porpoises will avoid a noise source, I have observed harbor porpoises moving away from a large airgun array at a distance of over 60 km (Bain, D.E. and R. Williams. 2006. Long-range effects of airgun noise on marine mammals: responses as a function of received sound level and distance. IWC SC/58/E35), so even though the drill ship is quieter, it is realistic that porpoises would be displaced at tens of kilometers, disrupting feeding behavior.

This sensitivity to noise is compounded by the over-inclusive division of the harbor porpoise population. Allen and Angliss (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.) noted, "In areas outside of Alaska, studies have shown that stock structure is more fine-scale than is reflected in the Alaska Stock Assessment Reports. At this time, no data are available to reflect stock structure for harbor porpoise in Alaska. However, based on comparisons with other regions, smaller stocks are likely. Should new information on harbor porpoise stocks become available, the harbor porpoise Stock Assessment Reports will be updated." Over the last 15 years, the number of stocks recognized along the Pacific Coast of the lower 48 states has risen

to six. In Alaskan waters, the number has risen to only three. That is, the stock to be affected by the exploration is likely to be far smaller than currently recognized. The implication is that the population is far less able to tolerate takes than expected based on the current stock definition.

As with belugas, a population census of the Bering Strait stock of harbor porpoises, whose range includes the Chukchi Sea, has not been conducted in the last ten years, and the trend at the time of the last census was unknown (Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-223, 292 p.).

Flight may lead to injury in some species. Exhaustion from rapid flight leading to heart or other muscle damage (Williams, E. S., and E. T. Thorne. 1996. Exertional myopathy (capture myopathy). Pp. 181-193 in A. Fairbrother, L. N. Locke and G. L. Hoff (eds.), Non-infectious diseases of wildlife. Iowa State University Press, Ames, Iowa) could result in increased mortality, as was observed in harbor porpoises following sonar exercises in Juan de Fuca and Haro Straits in April and May of 2003 (Assessment of acoustic exposures on marine mammals in conjunction with *USS Shoup* active sonar transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington ~ 5 May 2003 ~ National Marine Fisheries Service, Office of Protected Resources January 21, 2005 13 pp.). Harbor porpoises, in contrast to Dall's porpoises, rarely engage in sustained high energy activities such as rapid swimming or bow riding, and hence are less adapted to long distance flight responses.

Even successful flight may have negative survival consequences. Although many noise exposure protocols consider movement of animals out of the area an acceptable outcome, as the animals are not exposed to high levels of noise, as noted above such movement requires expenditure of significant amounts of energy. Assuming animals were in optimal habitat, moving out of that habitat is likely to have consequences such as reduced foraging efficiency. This is of particular importance in the Arctic, where nutrients from fresh water sources, ice cover, bottom topography, currents, and other factors influence prey density (National Research Council. 2003. Cumulative environmental effects of oil and gas activities on Alaska's North Slope. National Academies Press. 288 pp., and Minerals Management Service. 2004. Environmental Assessment Proposed Oil and Gas Lease Sale 195 Beaufort Sea Planning Area. OCS EIS/EA MMS 2004-028). Such factors vary temporally, resulting in the location of patches of high quality habitat varying through time. Such highly productive patches are likely to be rare, so displacement from these areas would negatively affect individuals. Small cetaceans (e.g., harbor porpoises), especially individuals in poor condition, face a risk of death if they are unable to feed for periods as short as 48-72 hours (personal observation). They may also move into habitat where they face increased risk of predation.

Finally, the density estimates for harbor porpoises may be low. Sightings were averaged over three years by Shell in its IHA application. While this may be appropriate for calculating a best estimate of density, it is unlikely that a three year sample would include an annual estimate greater than 95% of annual counts, and therefore is not suitable for estimating the maximum

number of takes. Since density was determined during industry operations, counts may have been depressed due to displacement of individuals.

Like belugas, harbor porpoises are likely to be affected by ice breaker noise when it is barely audible. This would occur at about 20 km under typical conditions, and perhaps as far away as 80 km. Although the drilling noise is concentrated at low frequencies, source levels in 1/3 octave bands at frequencies porpoises hear well are at around 140 dB, so should be audible and are likely to cause effects at considerable distances.

In summary, effects on the harbor porpoise stock have been underestimated for a variety of reasons. Additional data are likely to show that the affected stock is smaller than anticipated. The number of individuals taken at a given moment is the area exposed multiplied by density, both of which have been underestimated. The area in which takes are likely to occur will be larger than estimated in the IHA because: 1) the source level estimate for the Discoverer is a minimum estimate; 2) sound will propagate more efficiently than anticipated much of the time; and 3) the threshold for harbor porpoises to be taken can be as low as 70 dB. More rigorous census information may reveal higher densities than those used to calculate takes. Moreover, due to the duration of the project, porpoises not initially exposed will have time to move to the ensonified area over the course of the drilling season. Until the magnitudes of these effects are determined, and other uncertainties like population trends are resolved, NMFS cannot adequately assess the potential for adverse effects on this species. Hence it cannot conclude the species will not be harmed.

The Alaska Region Office of Environment provides these comments on behalf of the Alaska Region regarding the Department's Office of Environmental Policy Compliance Environmental Report (ER) 11/1032. ER 11/1032 regards the application from Shell Offshore Inc. (Shell) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to offshore exploration drilling on Outer Continental Shelf (OCS) leases in the Chukchi Sea, Alaska (76 Federal Register 69958-70008).

Issuance of this IHA for this activity would fulfill requirements identified under the existing Biological Opinion (BO) issued by NMFS to BOEM (formerly MMS) in July 2008 (USDOC, NMFS, 2008). That BO stated, "This opinion does not include an incidental take statement at this time. Upon issuance of regulations or authorizations under Section 101(a)(5) of the Marine Mammal Protection Act and/or its 1994 Amendments, NMFS will amend this opinion to include an incidental take statement(s) for the described work." As such, an IHA issued to Shell will result in concurrent obligations to BOEM via the existing BO.

The Alaska Region has the following comments on the Federal Register Notice (Notice):

- Effects on other Marine Mammals.

  The Proposed IHA contains draft conditions, including (3)(b) that states "…the taking of any kind of any other species of marine mammal is prohibited and may result in the modification, suspension or revocation of this Authorization." Polar bear critical habitat was designated along the Chukchi Sea coastline, including "…barrier island habitats and spits off the Alaska coast provide areas free from human disturbance…" (75 FR 76122). According to the Programmatic Biological Opinion for Polar Bears (*Ursus maritimus*) on Chukchi Sea Incidental take Regulations (USDOI, FWS, 2008), routine, non-emergency operation of aircraft should occur in a manner that minimizes, to the greatest extent possible, adverse impacts to polar bears and their habitat, including that aircraft activities be conducted at the maximum distance possible and with minimum flight elevations from polar bears on land. BOEM recommends NMFS describe how the Holder of the Authorization would conduct the NMFS-required, periodic low-level (<1,500 ft AGL) aerial marine mammal surveys to avoid affecting polar bears or disturbing polar bear critical habitat in this area. BOEM also recommends inclusion of a description of how these flights are to be conducted and avoid adverse effects to Pacific walrus on haul-outs along shore between Cape Lisburne and Barrow.

  Similarly, BOEM recommends NMFS describe how the Holder of the Authorization would conduct the NMFS-required, periodic low-level aerial marine mammal surveys to avoid impacts to Pacific walrus.

- Section (4).

  BOEM recommends this section include aircraft associated with the required low-level marine mammal surveys.

- Section (7)(d).

  BOEM recommends clarification of NMFS' intent to require low-level (<1,500 ft AGL) aerial marine mammal surveys as an exception to the General Mitigation requirement that aircraft not fly below 1,500 ft altitude except during takeoffs and landings, or in emergency situations.

- Section (7)(f).

  BOEM recommends this section, or a new similar section focusing on aerial observations, require the marine mammal observation reports to include the location and altitude of the aircraft at the time of each observation.

- Section (9)(a).

  This section directs the Holder of the Authorization regarding vessel transit in relation to an undefined polynya zone. BOEM believes NMFS should provide a definition of the polynya zone, so the Holder of the Authorization can effectively comply with this condition.

- Section (9)(f).

  This section requires the Holder of the Authorization to "…not operate aircraft below 1,500 ft (457 m) unless engaged in marine mammal monitoring…", which appears inconsistent with condition (7)(d).

- Section (10).

  This section requires the Holder of the Authorization to "…implement the aerial survey monitoring program detailed in its Mitigation and Monitoring Plan (4MP)". BOEM recommends inclusion of a brief description of the 4MP and similar programs as a part of the proposed action.

- Limits of Incidental Take.

  The draft IHA does not provide limits of incidental take to species, nor require the Holder of the Authorization to not exceed this limit. This appears inconsistent with similar IHAs (e.g., Statoil 2011: www.nmfs.noaa.gov/pr/pdfs/permits/statoil_iha_issued2011.pdf). BOEM recommends NMFS clarify to what extent the Holder of the Authorization would or should monitor/report their incidental take on a more regular basis so to not exceed a specified authorized incidental take prior to submission of a draft 90-day report.

- NEPA.

  Page 70007 of the Notice states that NMFS is currently preparing an Environmental Assessment (EA), pursuant to NEPA, to determine whether the issuance of an IHA to Shell for its 2012 drilling activities may have a significant impact on the human environment. Aircraft and vessel operations may affect coastal and marine wildlife and we recommend the EA fully evaluate the potential for the NMFS-required, periodic low-level (<1,500 ft AGL) aerial marine mammal surveys and vessel operations to impact marine and coastal resources within the Ledyard Bay Critical Habitat Unit (LBCHU) and adjacent areas. The NMFS typically requires an industry research program that includes these activities and these activities are part of the proposed action for NEPA evaluation. The industry-funded marine mammal survey program is similar to two other agency-funded marine mammal survey programs in the same area. If NMFS continues to require low-level aerial marine mammal surveys, we recommend NMFS require marine mammal observation reports to include the location and altitude of the aircraft at the time of each observation. BOEM recommends NMFS also require observations of marine and coastal birds using a systematic survey protocol during any NMFS-required vessel entries into

the LBCHU, as well as requiring that these vessels not approach flocks of eiders and that vessel routing be the shortest distance within the LBCHU.

- ESA.

  Page 70007 of the Notice states that NMFS' Permits and Conservation Division will initiate consultation with NMFS' Endangered Species Division under section 7 of the ESA on the effects of the proposed action on three marine mammal species listed as endangered under the ESA: the bowhead, humpback, and fin whales. BOEM recommends NMFS determine whether the proposed action is likely to jeopardize the continued existence of species proposed for listing (the ringed seal and the Beringia Distinct Population Segment of the bearded seal) as required by ESA Section 402.10.

  Furthermore, the Service's Consultation Handbook specifies that coordination between the USFWS and NMFS is critical to ensure that section 7 consultation is approached in a consistent manner. For BOEM's ESA section 7 consultation, USFWS includes a condition intended to avoid oil and gas industry vessel activity within the LBCHU after July 1 to avoid adverse effects to threatened eiders. Similarly, aircraft activities associated with BOEM-authorized oil and gas exploration include an altitude restriction over the LBCHU. The same BOEM condition directs industry aircraft avoid low-level (< 1,500 ft AGL) aircraft flights over adjacent beach areas as much as possible to protect marine and coastal birds. These restrictions also help avoid adverse effects to Pacific walrus haul-outs and subsistence hunting activities. BOEM recommends NMFS consult with USFWS regarding the effects of the proposed action on resources under USFWS jurisdiction, including the compatibility of the joint industry research program that NMFS continues to require in IHAs with the existing ESA section 7 consultation between BOEM and USFWS.

CONSUMERENERGYALLIANCE

2211 Norfolk Street, Suite 614
Houston, Texas 77098
P 713 337 8800
F 866 273 8998
www.consumerenergyalliance.org

Michael Payne, Chief
Permits and Conservation Division, Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
ITP.Nachman@noaa.gov

RE: Comments on Shell's Incidental Harassment Authorization (IHA) Application for Leases in the Chukchi Sea

Dear Mr. Payne:

On behalf of Consumer Energy Alliance, we strongly urge the National Marine Fisheries Service (NMFS) and the federal government to finalize Shell's application for an Incidental Harassment Authorization (IHA) for use during exploration of its leases in the Chukchi Sea. As the application demonstrates, Shell has correctly evaluated the species present in the proposed drilling area and is prepared to exceed expectations for marine mammal and habitat protection.

CEA is a non-profit, non-partisan organization committed to working with elected leaders, affected stakeholders and consumers to help create sound energy policy and maintain stable energy prices. As part of a balanced energy policy, CEA advocates for expanded domestic production and use of all energy resources, including traditional fossil fuel resources, nuclear energy, renewable sources, and energy efficiency and conservation, as a means to provide price stability for consumers. CEA has more than 170 affiliated organizations, including energy suppliers and producers, manufacturers, farmers, small businesses and community organizations, as well as a nationwide network of almost 300,000 consumer-advocates.

NMFS's assessment of Shell's application confirms that Shell has taken the necessary precautions to protect marine mammals in the proposed drilling area. As stated by NMFS, "Shell's planned offshore drilling program incorporates both design features and operational procedures for minimizing potential impacts on marine mammals and on subsistence hunts." Part of these mitigation efforts includes maintaining Protected Species Observers, or marine mammal observers, who will be on-site to monitor marine mammals and who can implement mitigation efforts if necessary. Although the NMFS has determined that few of the citied marine mammals will be present in the area during the proposed drilling period, Shell has implemented practices and procured technologies that will minimize impact in the chance a marine mammal may become present.

Although the IHA did not need to evaluate the likely impacts from an oil spill on marine life, the assessment concluded that "there is no reasonable likelihood of serious injury or mortality from the 2012 Chukchi Sea exploration drilling program." Citing the historical improbability of a very large oil spill as well as Shell's extensive Oil Spill Response Plan, the NMFS remains confident that marine mammals are not in danger of a potential oil spill.

Clearly, Shell has taken all necessary precautions – if not exceeded them – and has proven it can proceed with drilling in the Chukchi Sea without causing significant or permanent damage to marine wildlife. The

NMFS has had ample time to evaluate Shell's application and clarify any outstanding issues. Now that the NMFS has issued the proposed IHA, we urge the NMFS to move quickly to finalize the authorization.

Energy development in the Beaufort and Chukchi Seas has tremendous potential to bolster U.S. energy security and grow the economy. With a conservative estimate of 27 billion barrels of oil and 132 trillion cubic feet of gas, these resources will go a long way to securing our energy future. The Trans-Alaska Pipeline System (TAPS) – one of the most critical energy infrastructures in the United States – is averaging only 640,000 barrels of oil throughput a day, down from a high of nearly 2 million barrels a day in 1988. Without a significant source of new oil coming online, low throughput could force the pipeline to close in the coming decade, leaving millions of U.S. consumers, mostly on the West Coast, without a stable supply of oil.

Furthermore, an annual average of 54,700 new jobs would be created and sustained nationwide for 50 years from Alaskan OCS exploration and production. These new jobs would lead to over $145 billion in new payroll and over $193 billion in tax revenue for federal, state and local governments. At a time of fiscal austerity and high unemployment, private development that boosts this level of jobs-and-revenue creation – without taxpayers' money – is critical.

Shell is prepared to bring its world-class expertise, equipment and technology to the Arctic. Through years of careful scientific study, it has advanced the practices and technologies capable of minimizing environmental impact from its operations. In fact, Shell's proposed operations in the Chukchi have spurred the scientific evaluation critical to understanding marine wildlife and ecosystems in the Alaskan Arctic, and its proposed plans for summer 2012 will help further our understanding of how to protect marine animals in an environment increasingly exposed to commercial and military traffic.

Shell and Alaska have taken great strides to protect their environment and have proven, time and again, the ability to safely develop natural resources while protecting the surrounding environment. In closing, we again urge the NMFS to swiftly approve the IHA for Shell's proposed operations and permit the sound exploration of the Chukchi Sea to move forward in summer 2012.

Sincerely,

David Holt
President

MARINE MAMMAL COMMISSION

9 December 2011

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

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application from Shell Offshore, Inc., seeking an incidental take authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act. The applicant is seeking authorization to take small numbers of marine mammals by harassment incidental to offshore exploratory drilling at the Burger prospects in the Chukchi Sea, Alaska, during the 2012 Arctic open-water season. The Commission also has reviewed the National Marine Fisheries Service's 9 November 2011 Federal Register notice (76 Fed. Reg. 69958) announcing receipt of the application and proposing to issue the authorization, subject to certain conditions.

RECOMMENDATIONS

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

- issue the requested incidental harassment authorization but also facilitate development of conflict avoidance agreements that involve all potentially affected communities and co-management organizations and take into account potential adverse impacts on all marine mammal species taken for subsistence purposes including, but not limited to, bowhead whales;
- require Shell to collect all new and used drilling muds and cuttings and either reinject them or transport them to an Environmental Protection Agency licensed treatment/disposal site outside the Arctic;
- require Shell to evaluate the source levels of the *Discoverer* at the proposed drilling location and recalculate the 120-dB re 1μPa harassment zone and estimated takes as appropriate;
- require Shell to develop and employ a more effective means for monitoring the entire corrected 120-dB re 1μPa harassment zone for the presence and movements of all marine mammals and for estimating the actual number of takes, including, but not limited to, aerial and acoustic surveys of the proposed drilling site before, during, and after drilling operations: Shell also should make the data associated with the monitoring program publicly available for evaluation by independent researchers;
- track and enforce Shell's implementation of mitigation and monitoring measures to ensure that they are executed as expected;
- 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; and

- 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.

RATIONALE

Shell has proposed to drill up to four exploratory wells at Shell's Burger prospect (Lease Blocks 6764, 6714, 6912, 6812, 6762, and 6916) in the Chukchi Sea, Alaska, during the 2012 Arctic open-water season (July through October). Drilling would occur 105 to 125.5 km from shore, in waters 43.7 to 45.8 m in depth. Shell would use the drillship *Discoverer*, with estimated broadband sound source levels of 177–185 dB re 1μPa at 1 m. Shell also would deploy vessels and aircraft for ice management and other support. Sound pressure levels for the icebreaking supply ship *Robert Lemeur* were estimated to be 193 dB re 1μPa at 1 m. Shell would conduct geophysical surveys at the end of each drill hole using a zero-offset vertical seismic profile airgun array. A typical eight-airgun array consists of four 150 in^3 (2,458 cm^3) airguns and four 40 in^3 (655 cm^3) airguns, with source levels of 238 and 241 dB re 1μPa at 1 m, depending on source depth.

Drilling and associated activities could affect marine mammals in several ways. Sound emitted from drilling, ice management, and seismic profile surveys could cause marine mammals to change their behavior, modify habitat use patterns, or mask their calls. If received at sufficiently high levels, such sound also could affect marine mammals physically, including temporary or permanent hearing impairment. In addition, oil spills—albeit unlikely—have the potential to affect marine mammals through exposure to toxic contaminants either externally through contact with the oil or internally through ingestion of the oil or inhalation of oil fumes.

The Service preliminarily has determined that the proposed activities could result in a temporary modification in the behavior of small numbers of up to twelve species of marine mammals, but that the total taking would have a negligible impact on the affected species or stocks. The Service does not anticipate any take of marine mammals by death or serious injury. The Service believes that the likelihood of an oil spill is extremely remote and therefore does not propose to authorize take from an oil spill. The Service also believes that the potential for temporary or permanent hearing impairment from drilling and other acoustic impacts would be at the least practicable level because of Shell's proposed mitigation and monitoring measures, as well as additional mitigation and monitoring measures proposed by the Service. Together, those include—

(1) using Service-approved vessel-based observers to monitor for marine mammals on the drillship and all support vessels, including the ice management vessels, throughout the exploration drilling period;

(2) using two observers to monitor the 190- and 180-dB re 1 μPa exclusion zones (for pinnipeds and cetaceans, respectively) and beyond during active drilling or airgun operations and before and during start-ups of airguns day or night;
(3) using ramp-up and shut-down procedures;
(4) prohibiting initiation of airgun operations during nighttime or low visibility conditions after an extended shutdown;
(5) reducing vessel speed to 9 knots or less and avoiding multiple changes in vessel direction and speed within 274 m of whales;
(6) avoiding injury to whales by reducing vessel speed and changing direction as necessary, especially when weather conditions diminish visibility;
(7) limiting aircraft overflights to an altitude of 457 m or higher and a horizontal distance of 305 m or greater when marine mammals are present (except during takeoff, landing, or an emergency situation);
(8) conducting aerial surveys in the coastal areas of the eastern Chukchi Sea and to collect and report on beluga whales near traditional hunting areas;
(9) conducting in-situ measurements of sound propagation from the drilling vessel, support vessels, and the airgun array;
(10) deploying acoustic recorders to record vocalizations of bowhead whales as they migrate through the drilling area;
(11) deploying acoustic recorders widely across the U.S. Chukchi Sea to gain information on the distribution of marine mammals in the region;
(12) reporting injured and dead marine mammals to the Service and local stranding network using the Service's phased approach and suspending activities, if appropriate; and
(13) submitting field and technical reports and a final comprehensive report to the Service.

Availability of marine mammals for subsistence

Shell has met, and plans to continue meeting, with various stakeholders to develop and implement a plan of cooperation. The plan specifies measures to minimize impacts to Alaska Natives who use marine mammals for subsistence purposes. As part of the plan, Shell would not bring its drillship and support vessels into the Chukchi Sea before July 1. Vessels that can travel safely outside the polynya zone would do so, and would notify the communication and call centers in local communities if it is necessary to move into the polynya zone to avoid ice breaking. Shell also would implement a proposed communication plan with local subsistence users and village whaling associations before initiating exploratory drilling operations and maintain communication throughout the open-water season. Shell would employ local subsistence hunters from the Beaufort and Chukchi Sea villages to advise the company regarding the whale migration and subsistence hunt. Finally, Shell would recycle all drilling mud to the extent practicable. Based on the timing and location of the proposed activities and these additional mitigation measures, the Service preliminarily has determined that the expected taking would not have an unmitigable adverse impact on the availability of marine mammals for subsistence use by Alaska Natives. Shell should be acknowledged for its efforts to avoid such impacts.

However, it is not yet clear that those steps are sufficient. A determination of "no unmitigable adverse impact" on the availability of marine mammals for subsistence uses should be based, in part, on concurrence of those people who are the experts regarding the availability of marine mammals for subsistence hunts—the Alaska Native hunters themselves. Shell signed a conflict avoidance agreement in 2011 with the Alaska Eskimo Whaling Commission and intends to enter into negotiations again in 2012. Negotiating and completing a conflict avoidance agreement 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. For example, the Point Lay hunt for beluga whales occurs in late June or the first two weeks in July. If the hunt were delayed into mid-July, would Shell agree to delay its entry into the Chukchi Sea until after the hunt was completed to avoid deterring beluga whale movements? These and other potential issues should be addressed as part of a conflict avoidance agreement with, for example, the Alaska Beluga Whale Committee.

With these concerns in mind, the Marine Mammal Commission recommends that the National Marine Fisheries Service issue the requested incidental harassment authorization but also facilitate development of conflict avoidance agreements that involve all potentially affected communities and co-management organizations and take into account potential adverse impacts on all marine mammal species taken for subsistence purposes including, but not limited to, bowhead whales.

Mitigating impacts from drilling muds and cuttings

Unlike Shell's proposed Beaufort Sea exploratory drilling program, Shell is not proposing to collect drilling muds or cuttings for transport and disposal outside the Arctic. Shell states that "[B]oth modeling and field studies have shown that discharged drilling fluids are diluted rapidly in receiving waters" and that "[T]he impact of the limited amount of drilling mud and cuttings discharges would be localized to the drill sites and temporary." This might be acceptable if Shell were only planning on drilling a few exploratory wells. Clearly, however, the intent is to locate oil and gas reserves that can be exploited, which would involve much more drilling and, over time, the cumulative effects of repeated discharges could be significant. Shell also has stated that a considerable amount has been invested in research on exposures of marine mammals to organochlorines or other toxins. The Commission disagrees, as information regarding sub-lethal, long-term, and cumulative impacts from discharge of drilling muds and cuttings on marine mammals and the marine environment is quite limited. Studies done to date regarding the impacts on marine mammals from exposure to polycyclic aromatic hydrocarbons are informative, yet do not provide a sufficient basis for predicting, with full confidence, the severity of either short- or long-term effects of exposure (Marine Mammal Commission 2011). Therefore, as a prudent and precautionary measure, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to collect all new and used drilling muds and cuttings and either reinject them or transport them to an Environmental Protection Agency licensed treatment/disposal site outside the Arctic.

Monitoring impacts from drilling and ice management activities

Drilling and icebreaking are considered continuous sound sources and a 120-dB re 1μPa threshold was used to estimate the area in which marine mammals may be taken by Level B harassment. The "corrected" 120-dB re 1μPa harassment zone (the Level B harassment zone multiplied by 1.5) has a radius of 1.97 km for the *Discoverer*, and 9.50 km for icebreaking (Table 4 in the *Federal Register* notice). However, as noted in the Commission's comments regarding Shell's proposed drilling program for the Beaufort Sea, it is not clear which specific source level was used to model the size of the corrected 120-dB re 1μPa harassment zone for the *Discoverer*, as the reported source levels for the *Discoverer* ranged from 177–185 dB re 1μPa at 1 m. It also is not clear how the source level measurements taken in the South China Sea were incorporated in the model to estimate the 120-dB re 1μPa harassment zone in the Chukchi Sea.

In addition, the corrected 120-dB re 1μPa harassment zone for ice management activities is too large to be monitored effectively using visual methods, especially when visibility is poor. Acoustic recorders deployed widely across the U.S. Chukchi Sea and on the prospect would help provide information on the distribution of marine mammals, but the shortcomings of acoustic methods are well known. They do not provide a basis for tracking movements of animals in response to noise, they can be used to detect only those animals that vocalize, and they can be used as an index of abundance, but only if some substantial assumptions are made. In addition, marine mammals in the area may decrease their vocalization rate because of the noise from drilling operations (Richardson et al. 1985, Blackwell et al. 2011). In the Commission's view, the "net" array proposed by Shell would not be sufficient to characterize the distribution of marine mammals in the area or their responses to drilling operations.

In addition to expanding its acoustic monitoring capabilities, Shell also could use aerial surveys to detect marine mammals and characterize their responses to drilling operations. Shell has indicated that it does not consider aerial surveys to be sufficiently safe. However, it also plans to use airplanes for monitoring ice and helicopters for support activities at this site. That being the case, Shell is essentially indicating that it is willing to use aircraft to support its operations, but does not consider potential effects on marine mammals to be sufficient to warrant monitoring. The Marine Mammal Commission recognizes that aircraft must be used with caution in this region. However, it does not agree that the circumstances are such that aircraft cannot be used safely. Indeed, aerial surveys are flown throughout U.S. waters, including Alaskan and Arctic waters, to survey marine mammals. So while the Commission concurs with Shell's desire to ensure safety, it also believes that aerial surveys can be flown safely in this region.

To address these concerns, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Shell to evaluate the source levels of the *Discoverer* at the proposed drilling location and recalculate the 120-dB re 1μPa harassment zone and estimated takes, as appropriate. The Marine Mammal Commission further recommends that the National Marine Fisheries Service require Shell to develop and employ a more effective means for monitoring the entire corrected 120-dB re 1μPa harassment zone for the presence and movements of all marine mammals and for estimating the actual number of takes, including, but not limited to, aerial and

acoustic surveys of the proposed drilling site before, during, and after drilling operations. Shell also should make the data collected by the monitoring program publicly available for evaluation by independent researchers.

Requiring certain mitigation and monitoring measures will mean little if the parties involved fail to implement them. In this case, Shell is working under a tight schedule to drill its proposed wells, and its ability to meet that schedule would be determined in part by seasonal changes in weather and, particularly, ice conditions. Although Shell may recognize that the specified mitigation and monitoring measures are important, it may not deem these measures to be its highest priority if they conflict with operations considered essential to drilling progress. Under such conditions, mitigation and monitoring measures may not be fully implemented as the Service intended and their value may be compromised. To avoid such situations, the Marine Mammal Commission recommends that the National Marine Fisheries Service track and enforce Shell's implementation of mitigation and monitoring measures to ensure that they are executed as expected.

Mitigation measures for potential oil spills

The *Federal Register* notice and Shell's application provided a summary of potential risks to marine mammals from oil spills, including contact with oil, ingestion of oil or contaminated prey, and inhalation of oil. Shell also noted that oil spill cleanup activities may have more of an impact than the oil itself. The Commission believes that Shell's summary of potential impacts under-represents the risks to marine mammals, and that information regarding the long-term effects of exposure to oil and oil spill cleanup activities is inadequate (Marine Mammal Commission 2011). Shell also states that "[T]he likelihood of a large or very large … oil spill occurring during Shell's proposed program has been estimated to be low" and that Shell "will deploy an oil spill response (OSR) fleet that is capable of collecting oil on the water up to the worst case discharge (WCD) planning scenario." Here, too, the Commission believes these statements both downplay the potential risks of an oil spill to marine mammals and overstate Shell's oil spill response capabilities. The Commission also believes that the Service is being too dismissive of the potential for a large oil spill based on the conclusion that such a spill is not likely.

However, the risk of a 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. In all areas, but particularly in the Arctic, the longstanding but still unresolved question is whether the responsible parties can mount an effective response. Having just witnessed the requirements for and difficulties of responding to a major spill in the much less harsh environment of the Gulf of Mexico, the Commission sees no basis for concluding that the necessary response capability exists in Arctic ice conditions. 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 Commission does not mean to dismiss Shell's efforts to develop response capabilities, but the reality is that the harsh conditions and lack of infrastructure, trained personnel, supplies, etc., could make it virtually impossible to respond effectively to a significant Arctic spill.

With regard to marine mammals that might be affected, impacts from a spill would be determined by the time of year, the species in or migrating through the area down-current from the facility (i.e, in the spill's path), and the amount of disruption to their natural behavior (e.g., reproduction, feeding). Given that marine mammals move through this area in large pulses, it may or may not be the case that few animals would be affected; actual effects would depend on the timing and circumstances, such as the size of the spill. And although Shell has emphasized oil spill response strategies that would prevent oil from reaching shorelines, impacts to marine mammals would incur both from oil that remains in the offshore environment as well as oil that reaches the shore. It also 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).

Shell's Oil Discharge Prevention and Contingency Plan for the Chukchi Sea outlines several measures for preventing and responding to a spill, as summarized in the incidental harassment authorization application. Although Shell revised the contingency plan in May 2011 in response to new Bureau of Ocean Energy Management safety and environmental requirements, the contingency plan is still inadequate for addressing a large oil spill in the Arctic, and especially a worst case discharge. For example, the plan states that in the event of a worst-case incident (estimated at 25,000 barrels of oil per day for 30 days, for a total of 750,000 barrels), the "OSR [oil spill response] 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." However, the worst case discharge scenario and assertions regarding Shell's response capabilities are based on a summer (August) spill rather than a late October spill, which would be a more appropriate worst-case discharge. The plan also includes a response strategy for a spill of unspecified size occurring nine days before freezeup, noting that as the response enters Day 21, "it is no longer possible to conduct containment and recovery operations safely and effectively downstream of the blowout." These statements all indicate that Shell has little chance of recovering oil that spills once ice formation begins, which can vary from as early as the beginning of October to as late as the end of November.

Even if a spill were to occur during summer, Shell's ability to contain the well and recover spilled oil is limited by the lack of adequate infrastructure. The contingency plan states that the preference is to use the original drilling rig to drill a relief well. However, if there is damage to the rig as a result of a blowout or other accident, Shell would need to move a second rig onsite, which may take several weeks considering that the second rig would likely be fully engaged in drilling activities in the Beaufort Sea. The plan proposes to use skimming and in-situ burning for recovery of oil—technologies that were effective in recovering only 8 percent of the oil spilled from the Gulf of Mexico Macondo well (NOAA 2010) and which have not been proven (and cannot reasonably be assumed) to be effective in Arctic conditions.

In the event of a spill, Shell also has included provisions for wildlife protection in its contingency plan. However, the provisions of the "Wildlife Protection Plans" are limited to monitoring and deterrents at the spill site, hazing, placement of containment booms to prevent contamination of sensitive shoreline, and the designation of a facility to treat oiled animals. Based on experience gained from the Exxon Valdez, the Deepwater Horizon, and other small and large oil

spills, a more detailed, comprehensive, and coordinated strategy would be needed to respond to, recover, and rehabilitate oiled wildlife. The Commission must question whether such response activities are realistic, given that the expertise and infrastructure needed to conduct them are simply not available in the Arctic.

For these and other reasons, the Commission must question whether Shell can respond effectively to a large spill under harsh Arctic conditions. At the same time, the impact of a spill on Arctic marine mammals could be significant and long-lasting. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service 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. The Marine Mammal Commission also recommends that the National Marine Fisheries Service 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.

Please contact me if you have questions regarding these recommendations.

Sincerely,

Timothy J. Ragen

Timothy J. Ragen, Ph.D.
Executive Director

Cc: Kaja Brix, National Marine Fisheries Service Alaska Regional Office
Jim Kendall, Bureau of Ocean Energy Management Alaska Region

References

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North Slope Borough

OFFICE OF THE MAYOR

P.O. Box 69
Barrow, Alaska 99723
Phone: 907 852-2611 or 0200
Fax: 907 852-0337

Charlotte E. Brower, Mayor

December 9, 2011

P. Michael Payne, Chief
Permits, Conservation and Education Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Submitted via email: ITP.Nachman@noaa.gov

Re: RIN 0648-XA811, comments on Shell Offshore Inc.'s application for an Incidental Harassment Authorization for an Exploratory Drilling Program in the Chukchi Sea in 2012

Dear Mr. Payne:

Thank you for the opportunity to comment on Shell Offshore Inc.'s (Shell) Incidental Harassment Authorization (IHA) application for an exploratory drilling program in the Chukchi Sea in 2012. As you know, the North Slope Borough (NSB) and its residents are extremely concerned about the increased oil and gas activity in the Chukchi and Beaufort Seas. Shell's drilling operation is just one among many industrial activities planned for 2012. The many different activities, including Shell's drilling plan (this IHA application), have the potential to harass many of the marine mammals that are vitally important to North Slope residents.

NSB has previously commented on Shell's IHA applications for seismic and drilling in the Beaufort and Chukchi Seas. These comments are still applicable to the current application and are incorporated by reference. For previous IHA applications and other offshore activities, the NSB has repeatedly expressed concerns regarding the offshore oil and gas activities permitted by the federal agencies. These activities have the potential to negatively affect our "garden". The foods that are most important to our coastal villages come from the ocean. We remain concerned that Shell's planned activities will affect the resources upon which we depend. The National Marine Fisheries Service

(NMFS) can only issue an IHA for Shell's drilling plan if the agency is assured that enforceable mitigation measures will adequately protect our subsistence resources and harvesting. This pertains not only to bowhead whales but also to belugas, ringed and bearded seals, and other species.

Below are general comments, many of which we have made in the past.

I. Shell's Proposed Activities will Create Cumulative Impacts and Require an Environmental Impact Statement.

In the Federal Register Notice, NMFS generally states that it is "currently preparing an Environmental Assessment" to determine whether Shell's activities may have a significant impact on the environment (76 Fed. Reg. at 69958). But pursuant to the National Environmental Policy Act (*See* 42 U.S.C. 4321-4347) and its accompanying regulations (For specific regulatory guidance on making a significance determination, *see* 40 C.F.R. § 1508.27), NMFS should prepare an environmental impact statement (EIS) to adequately consider the potentially significant impacts, including the cumulative impacts of Shell's proposed activities. In particular, Shell's proposed drilling activities combined with all other past, present and reasonably foreseeable future activities will create potentially significant cumulative impacts (40 C.F.R. § 1508.7). NMFS should consider the cumulative impacts of Shell's Chukchi Sea proposal in combination with the following proposals, all of which may be planned for the 2012 open water season:

1) Shell's Beaufort Sea Exploration Plan,
2) ION's Beaufort Sea seismic surveys,
3) Seismic surveys planned in the Canadian Arctic,
4) Possible seismic surveys in the Russian Chukchi Sea,
5) BP's production operations at Northstar,
6) Barging operations for existing oil fields,
7) On-going scientific studies in the Chukchi and Beaufort Seas, and
8) Other activities.

If NMFS is in possession of applications and/or any other information regarding these activities, it should include it in the record for this action because that information is integral to a thorough, up-front analysis of cumulative impacts. NMFS must also consider the reasonably foreseeable drilling activities in future years. Future drilling is foreseeable for a number of reasons. In its Exploration Plan, Shell states that it will drill in multiple years beginning in 2012 (Revised Outer Continental Shelf Lease Exploration Plan, Chukchi Sea; page 1.1 and 1.2). Shell has also applied for a multi-year Clean Air Act permit from the Environmental Protection Agency (EPA) and has therefore already sought coverage for future drilling operations. Finally, ConocoPhillips plans to drill in the Chukchi Sea in 2013 and has begun its EPA and Department of Interior permitting process for that activity. Statoil has also been actively exploring in the Chukchi Sea and may also drill exploratory wells.

In conducting a cumulative impact analysis, NMFS should ascertain the significance of multiple exposures to underwater noise, ocean discharge, air pollution and vessel traffic; all of which could impact bowhead whales and other marine mammals and decrease survival rates or reproductive success. NMFS should consider how many bowhead whales would be exposed to underwater noise, where those

exposures could take place, what impact the noise could have on bowhead whale behavior and the biological significance of these impacts. NMFS should also 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 on the health of the local residents.

NMFS is currently in the process of preparing such an EIS in partnership with the Bureau of Ocean Energy Management (BOEM), assessing the potentially significant impacts of sounds from oil and gas exploration activities in the Arctic. In choosing this course, NMFS has recognized that these activities can have significant impacts on marine mammals and that a longer term, more comprehensive review needs to be taken of these activities. It would be shortsighted to allow Shell to proceed on a one-year IHA when the impact of those activities authorized by the IHA could negatively affect arctic resources and preclude options that could be developed in the forthcoming EIS. It would be best to take the opportunity to develop a robust long-term plan for balancing the needs of industry with Congress' mandate in the Marine Mammal Protection Act to prioritize the protection of our subsistence resources.

II. The Marine Mammal Protection Act (MMPA)

The MMPA imposes a "moratorium on the taking" of marine mammals. 16 U.S.C. § 1371(a). The MMPA provides several narrow exceptions to the moratorium on take. NMFS may authorize take in the form of harassment by an Incidental Harassment Authorization (IHA) provided certain conditions are met. To receive such take authorization, an activity (i) must be "specified" and limited to a "specified geographical region," (ii) must result in the incidental take of only "small numbers of marine mammals of a species or population stock," (iii) can have no more than a "negligible impact" on species and stocks, and (iv) will not have "an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives. Furthermore, in issuing an authorization, NMFS (v) must provide for the monitoring and reporting of such takings and (vi) must prescribe methods and means of effecting the "least practicable impact" on the species or stock and its habitat. 16 U.S.C. §1371(a)(5)(D); 50 C.F.R. § 216.107. As discussed more fully below, NMFS has not demonstrated that the proposed IHA will meet these standards.

A. Level and Effect of Industrial Sounds

Shell does not provide adequate information about the level and effect of industrial sounds. The application generally discusses sounds produced by the drill rigs and vertical seismic profile, but provides little information about sounds produced by ice management vessels (i.e. icebreakers), oil spill response vessels and other support vessels. It is likely that the icebreakers and re-supply vessels will contribute considerably more sound to the ocean than the drill rigs. At Northstar Development Island, the day-to-day operations of the island are relatively quiet. However, vessels that re-supply the island contribute the loudest sounds, and it is clear that sounds from these vessels affect bowhead whales. Vessels associated with Shell's drilling operation must be considered in the IHA application. Neither the NMFS nor the public can adequately review Shell's application without this information and assessment of additional takes associated with sounds from Shell's support vessels.

B. Small Number & Negligible Impact

The proposed IHA does not demonstrate that Shell's activities will take only a small number and have only a negligible impact on the species or stock. NMFS can grant an IHA allowing for incidental take of marine mammals only if such take will be limited to "small numbers" and have a "negligible impact" on the species or stock. 16 U.S.C. § 1371(a)(5)(D)(i)(I); 50 C.F.R. § 206.107. These are separate and distinct statutory requirements. *Id. Natural Resources Defense Council v. Evans,*232 F.Supp.2d 1003, 1025 (N.D. Cal. 2002); *see also Natural Resources Defense Council* v. *Evans,* 364 F. Supp. 2d 1083 (N.D. Cal. 2003). The proposed IHA illegally fails to distinguish between these two standards.

Shell's estimates of the numbers of marine mammals that may be taken by harassment are biased low. They calculate two estimates of density, one for the summer and another for the fall. This approach makes the assumption that marine mammals are stationary over these two periods. In reality, marine mammals are moving through the planned operation area. It is not unrealistic to expect that animals that are present one day are different from the individuals that might be there the next day. Satellite tagging data on bowheads and belugas reveal that whales are moving through the Beaufort and Chukchi Seas and do not remain in one space for a long period of time (Suydam et al. 2005; Quakenbush et al. 2010). One reason Shell's requested number of takes is biased low is because marine mammals constantly move through the operation area. It is likely that the number of marine mammals exposed to sound from Shell's operation is much larger than requested.

Furthermore, density estimates for cetaceans may also be biased low. Shell used average beluga density estimates based on results from ship surveys. Observers on ships saw very few belugas. This may in large part be due to belugas fleeing large ships. Available data show that belugas are very sensitive to large vessels, including icebreakers. In one study, belugas began responding to an icebreaker when it was still 35 to 50 km away (Finley et al. 1990). That distance is far beyond the viewing range of observers on board the vessels. Additional evidence indicates that tens of thousands of belugas pass through the Chukchi Sea during the autumn migration. These animals are from two stocks, the Beaufort Sea and the eastern Chukchi Sea. It stands to reason that more than the 15 belugas Shell has requested to take by harassment would be exposed to industrial sounds from the activities proposed for Shell's drilling in the Chukchi Sea in 2012. This same situation may easily be the case for bowheads and other cetaceans as well. Again, Shell's requested take of marine mammals for the Chukchi Sea is biased low.

For both of these reasons, it is not possible for NMFS or the public to determine if the incidental takes of marine mammals proposed by Shell are small or will have a negligible impact.

C. Area of Ensonification

Shell's estimated numbers of marine mammals that may be taken by harassment are biased low for another reason as well. Shell modeled the area ensonified by the drillship Discoverer. The area ensonified to 120 dB by the Discoverer in the Chukchi Sea was modeled to be 1.31 km whereas the area modeled for the Beaufort Sea was 3.32 km. It seems likely the difference between these two estimates was due to differences in the bottom type and water depth. However, there seems to be some other problem with the estimates. The area ensonified to the 120 dB level for the Discover in the Beaufort was

considerably lower than for the Kulluk, yet the source levels were very similar (~185 dB). It appears that Shell may have used a lower source level from the Discoverer rather than the higher measurement. Estimated takes of marine mammals should be based on the worst case scenario. In this case the higher source level would result in a larger area ensonified and more animals exposed to industrial sound. This would result in a biased estimate of takes.

Again, it is not possible for NMFS or the public to determine if the incidental takes of marine mammals proposed by Shell are small or have a negligible impact.

D. Adverse Impact to Subsistence Hunts

The MMPA requires that any incidental take authorized will not have "an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives. 16 U.S.C. § 1371 (a)(5)(D)(i)(II). Shell has worked closely with the Alaska Eskimo Whaling Commission to avoid impacts to the bowhead hunt in the Beaufort Sea. The NSB appreciates this effort to mitigate impacts to the bowhead hunt. Unfortunately, Shell's proposed activities may adversely impact subsistence hunting of bowheads and other species in the Chukchi Sea.

The transport, presence and operation of drill rigs, icebreakers, and other support vessels in the Chukchi Sea during early July could have a significant impact on a large number of belugas. This is the time eastern Chukchi Sea beluga whales are moving toward coastal areas near Point Lay and Wainwright. It is at this time of year that subsistence hunts at these two villages occur. Residents of Point Lay are particularly concerned that belugas could be deflected away from coastal areas or become skittish and more difficult to hunt. Shell discounts the possibility that its activities in the Chukchi Sea in early July could affect belugas and the subsistence hunt for belugas. If allowed to operate in early July, many eastern Chukchi Sea belugas could be harassed by the presence and operation of Shell's vessels before the subsistence hunt for belugas occurs at Point Lay. Mitigation measures are needed to protect eastern Chukchi Sea belugas and beluga hunters. Restricting the presence of Shell's vessels in the Chukchi Sea until the hunt is completed at Point Lay would be an effective mitigation measure.

Shell has not provided any information regarding, nor has NMFS discussed, the impacts to subsistence use of bearded and ringed seals in early July. Seal hunting typically occurs in mid to late June and early July in North Slope villages, in both the Chukchi and Beaufort Seas. During the transit of the drill rig, icebreakers and other support vessels, there could be substantial impacts or disturbance to seals. This disturbance could make it more difficult for hunters to harvest seals. The IHA application must evaluate the impacts to seals from not only the drilling activities but also the transit and presence of vessels associated with Shell's planned activities.

E. Monitoring Plan

Shell's marine mammal monitoring plan for the Chukchi Sea is lacking. Shell intends to station observers on vessels to monitor for marine mammals. The visual observers on board vessels will only have a limited zone they will be able to monitor. Based on previous results from Shell, marine mammals more than 1.5 or 2 km from the vessel may be present but not observed. Shell will also deploy a broad acoustic array across the Chukchi Sea and have a denser array near the Burger Prospect. Acoustic arrays

will only detect calling animals and many marine mammals vocalize infrequently during the summer and autumn, therefore monitoring results will be biased towards the animals that call. If the harassment zone in the Chukchi Sea is similar to the zone in the Beaufort Sea (based on past studies the zone was >20km), the acoustic array may not be sufficient for monitoring the entire zone. While the acoustic arrays and the on-board observers will provide important information, the data will be limited. Shell should be required to improve their monitoring plan to provide a greater capacity for actually being able to estimate the number of marine mammals harassed by their operations.

In the Beaufort Sea, Shell will be flying aerial surveys around their drill rig. The combination of visual sightings and acoustic locations provide a robust data set for assessing harassment and deflection of marine mammals away from the planned activities. In the past, Shell has claimed that flying aerial surveys in the Chukchi Sea is too risky. Yet, Shell is flying aerial surveys for the presence and distribution of ice in both the Chukchi and Beaufort Seas, and they plan to fly regular helicopter flights between shore and the drill rig for transfer of personnel and supplies. Given that Shell is willing to fly aircraft offshore in the Chukchi Sea to support the drilling operation, NMFS should also require Shell to fly aerial surveys for marine mammals or implement another proven technique that can monitor the potential area of harassment. Using both adequate visual and acoustic monitoring, information will be more suitable for understanding impacts and developing appropriate future mitigation measures to protect marine mammals and subsistence hunters.

Monitoring data previously collected by Shell have not been publically available. Because Shell is exposing marine mammals to industrial sounds and potentially deflecting them away from migration, feeding and resting areas, NMFS should require that the monitoring data, including locations and activities of drill rigs, icebreakers and support vessels be made publically available. Previously, oil companies operating in the Beaufort and Chukchi Seas have claimed the monitoring data are proprietary. Because the marine mammal resources are public ones and because they are important for the cultural and nutritional well-being of North Slope communities, the monitoring data should be available to other entities for evaluation. NMFS should require Shell to make monitoring data publically available as a requirement of the IHA.

F. Water Discharge

Shell intends to discharge muds and cuttings and various other substances into the Chukchi Sea. In the Beaufort Sea, Shell has agreed to have a near zero discharge policy. Drilling muds, cuttings and other discharges will be hauled out of the Beaufort Sea, and disposed of outside of the area. This is the best management practice as it reduces potential harm to marine mammals and their habitat. Shell should be required to have a near zero discharge policy in the Chukchi Sea as well as in the Beaufort Sea. That approach imposes the least practicable harm to marine mammals, their habitat and subsistence hunters.

III. NMFS and Shell Must Consider the Potential Impacts, including Site-Specific Impact Analysis, of a Blowout and/or Major Oil Spill.

Shell's application materials and NMFS's public notice appear to disregard the threat of an oil spill and the resulting takes of marine mammals and interference with subsistence activities that may consequently occur. In light of the recent Gulf of Mexico disaster, the application should be returned to the applicant for inclusion of this necessary site-specific detail.

Shell's application lacks any information about potential take resulting from a release of oil in any amount. The federal register notice for this proposed action does not include any mention of a possible release of oil and the potential harm to marine mammals and subsistence activities. There is no rationale for ignoring these potential impacts in the face of abundant evidence that marine mammals are vulnerable to the effects of exposure to oil.[1]

Given the project's location is an area where thousands of bowhead whales, tens of thousands of belugas, and hundreds of thousands of pinnipeds migrate and possibly feed, the omission of oil spill analysis is a serious concern. This area is also near the subsistence hunting grounds for the villages of Point Hope, Point Lay, Wainwright and Barrow. A large oil spill in this habitat during the summer or fall could expose thousands of marine mammals to oil, causing long-term interference with the subsistence activities of our residents and with the local culture, and long-term contamination of this relatively pristine arctic environment.

Armed with the knowledge of the Deepwater Horizon blowout, we must no longer assume that offshore oil and gas activities are risk-free.

For these reasons, NSB recommends that, if NMFS issues Shell an Incidental Harassment Authorization, the agency impose several additional requirements, including: (1) Shell revise its modeling results for the Discoverer to more accurately reflect the area that may be ensonified; (2) Shell revise its take estimate to more accurately reflect the number of marine mammals that may be taken by harassment; (3) Shell revise its monitoring plan, perhaps to include aerial surveys, so they can monitor beyond viewing range of observers on board vessels and more accurately calculate the number of marine mammals that were harassed after their operations are completed in 2012; (4) Shell should be required to make their monitoring data publically available; and (5) Shell should implement a near zero discharge policy for the Chukchi Sea so that the least practicable harm occurs to marine mammals, the environment and subsistence hunters.

NSB also requests clarification from NMFS on whether and how the agency considers the risk of an oil spill when authorizing exploratory drilling activities pursuant to the Marine Mammal Protection Act, including a complete rationale for the agency's position. In regulating industrial activities pursuant to the Marine Mammal Protection Act, NMFS should consider the consequences of a major spill in arctic waters.

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[1] See e.g. Geraci, J.R. and D.J. St.Aubin, Sea mammals and oil: confronting the risks (Academic Press Inc., San Diego) (1990); National Research Council, Cumulative environmental effects of oil and gas activities on the Alaska's North Slope, Chapter 8: Effects on Animals—Marine Mammals & Seals and Polar Bears (The National Academies Press, Washington D.C.) (2003).

I hope you carefully consider the comments of the North Slope Borough. Thank you again for the opportunity to comment on Shell's IHA application for the Chukchi Sea.

Sincerely,

Ethel Patkotak, acting
for Charlotte E. Brower
Mayor

cc Taqulik Hepa, Director, NSB Department of Wildlife Management
Rhoda Ahmaogak, Director, NSB Department of Planning & Community Services
Ethel Patkotak, NSB Attorney
Richard Camilleri, Advisor to Mayor Brower
Ian Young, Advisor to Mayor Brower
Andy Mack, Advisor to Mayor Brower

RESOURCE DEVELOPMENT COUNCIL

Growing Alaska Through Responsible Resource Development

December 1, 2011

Michael Payne, Chief
Permits and Conservation Division, Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
ITP.Nachman@noaa.gov

RE: Comments on Shell's Incidental Harassment Authorization for the Chukchi Sea

Dear Mr. Payne:

The Resource Development Council (RDC) is writing to encourage the National Marine Fisheries Service (NMFS) and the federal government to finalize Shell's application for an Incidental Harassment Authorization (IHA) for exploration of its leases in the Chukchi Sea. Shell has studied the species in the lease areas and will provide a high level of protection for marine mammal and their habitat.

RDC is an Alaskan business association comprised of individuals and companies from Alaska's oil and gas, mining, forest products, tourism, and fisheries industries. Our membership includes all of the Alaska Native Regional Corporations, local communities, organized labor, and industry support firms. RDC's purpose is to expand the state's economic base through the responsible development of our natural resources.

NMFS's assessment of Shell's application is correct in confirming the company has taken the appropriate steps in protecting marine mammals in the areas where drilling is to occur. In its assessment, NMFS noted, "Shell's planned offshore drilling program incorporates both design features and operational procedures for minimizing potential impacts on marine mammals and on subsistence hunts."

Shell's program will employ trained observers to monitor marine mammals and implement mitigation efforts if necessary. In the event marine mammals are present in the area during the proposed drilling period, Shell will deploy certain practices and technologies to minimize potential impacts.

RDC agrees with the NMFS that "there is no reasonable likelihood of serious injury or mortality from the 2012 Chukchi Sea exploration drilling program." We also agree that marine mammals are not in danger of a potential oil spill, given the improbability of a very large spill and Shell's extensive Oil Spill Response Plan.

Shell is ready to drill in the Arctic. It has spent years and billions of dollars in preparing for a robust and environmentally responsible exploration program. The company has taken all necessary precautions and has exceeded expectations in its goal of exploring the Chukchi Sea in a manner that causes no significant or permanent damage to marine wildlife. Given NMFS has issued the proposed IHA, I urge the NMFS to finalize the authorization.

121 West Fireweed Lane, Suite 250, Anchorage, Alaska 99503-2035
Phone: 907-276-0700 Fax: 907-276-3887 Email: resources@akrdc.org Website: akrdc.org

According to BOEM, the Alaska OCS constitutes one of the world's largest untapped energy resources with an estimated 27 billion barrels of oil and 132 trillion cubic feet of natural gas in place. By comparison, total production from the North Slope since 1977 has been approximately 15.5 billion barrels. Essentially, Alaska holds the eighth largest oil reserves in the world ahead of Nigeria, Libya, Russia and Norway. The Chukchi Sea itself is considered the nation's most prolific, unexplored offshore basin in North America.

The Alaska OCS could produce one to two million barrels per day, boosting current U.S. production by 20 to 40 percent. At today's oil prices, slashing imports that much would reduce the nation's trade deficit up to $65.7 billion a year. Last year, when oil averaged $78 a barrel, the U.S. sent $260 billion for imported crude, accounting for nearly half of the country's $500 billion trade deficit, according to the Institute for Energy Research.

The responsible development of potentially immense oil and gas deposits in the Arctic would significantly boost Alaska's economy, extend the life of the trans-Alaska Pipeline System (TAPS), improve the economic viability of the proposed natural gas pipeline from the North Slope to the Lower 48, reduce America's reliance on foreign energy, create tens of thousands of new jobs and generate hundreds of billions of dollars in federal, state, and local government revenues. Moreover, oil and natural gas production in the Arctic would enhance our nation's energy security and grow its economy.

The biggest threat to Alaska's economy is the sharp ongoing decline in TAPS throughput, which has fallen from 2.1 million barrels per day (bpd) in 1988 to an average of 574,000 bpd from January through October of this year. Both President Obama and Governor Sean Parnell have stated that increasing TAPS throughput is a national priority and in the nation's best interest. However, without a significant source of new oil, low throughput could force the premature shut down of the pipeline, leaving millions of West Coast consumers without a stable domestic supply of oil.

Shell stands ready to bring its world-class expertise, equipment and technology to the Alaska offshore. Through years of extensive scientific study and planning, it has advanced the practices and technologies to minimizing impact from its operations. In fact, Shell's proposed plans have advanced our understanding of how to protect marine animals in an area with increasing commercial and military traffic.

RDC has as high level of confidence in Shell. We believe the company is willing and ready to explore its leases in an environmentally-responsible manner. Shell has the ability to safely produce the potentially vast energy resources of the Arctic. I urge the NMFS to approve the IHA for Shell's proposed operations so that exploration in the Chukchi Sea can move forward in 2012.

Sincerely,

Carl Portman
Deputy Director

Shell Exploration & Production Company
3601 C Street, Suite 1000
Anchorage, Alaska 99503
Tel 907.770.3700
Fax 907.646.7135
Internet http://www.shell.com

December 9, 2011

Via U.S. Mail & Electronic Delivery (ITP.Nachman@noaa.gov)

Michael Payne
Chief, Permits and
Conservation Division, Office of
Protected Resources, NMFS
1315 East-West
Highway, Silver Spring, MD 20910

RE: Shell Gulf of Mexico Inc. Comments on 2012 Proposed Incidental Harassment Authorization, Exploration Drilling Program, Outer Continental Shelf, Chukchi Sea, Alaska

Dear Mr. Payne,

This is to convey to you the comments of Shell Gulf of Mexico Inc. (Shell) on the notice published in the Federal Register by the National Marine Fisheries Service (NMFS) on November 9, 2011, regarding the issuance of an Incidental Harassment Authorization (IHA) for Shell's exploration drilling program in the Chukchi Sea during the 2012 open water season. Enclosed herewith is a table with comments on certain sections of the draft IHA published with NMFS' notice on November 9, Federal Register Vol. 76, No. 217. In addition, given the importance of the subject, below is a narrative discussion regarding key features of Shell's Chukchi Sea Regional Oil Discharge Prevention and Contingency Plan (C-Plan).

Shell's C-Plan was originally prepared in March 2010 and approved by the Minerals Management Service on April 6, 2010 for Shell's planned 2010 exploration drilling program. The C-Plan was updated in May 2011 to conform with various changes made by the Department of Interior and the Bureau of Ocean Energy Management (BOEM) to the regulations and guidance governing offshore oil and gas exploration and development. Shell's C-Plan serves two purposes, as set forth in the governing federal and state regulations and guidance, including Notices to Lessees (NTLs). First, the C-Plan is a detailed planning document to help identify and establish the company's state-of-the-art oil spill prevention procedures. Second, the C-Plan estimates the potential discharges and describes the resources and steps that would be taken by Shell (and its contractors) to respond in the unlikely event of a spill. That response plan addresses a range of spill volumes, ranging from small operational spills to the worst case discharge (WCD) calculations required in the unlikely event of a blowout.[1] To ensure the safety of its employees,

[1] Note that WCD volume in Shell's C-Plan appropriately differs from that in BOEM's recent Supplemental Environmental Impact Statement concerning Lease Sale 193 (Sale 193 SEIS). The WCD volume in Shell's C-Plan was developed using well-specific data generated during Shell's exploration drilling activities at these specific Chukchi Sea locations in the late-1980s, and the reservoir characteristics were modeled in

the public and the environment, Shell has compiled a comprehensive, meaningful C-Plan that develops successful prevention tools and necessary response elements in great detail. Shell takes its responsibility seriously, and its C-Plan is not a stack of paper that sits on a manager's shelf. It is a living document that forms the basis for training its employees, and for determining and assembling the assets and equipment needed to respond to a spill.

An extensive set of federal and state regulations govern the elements that must be addressed in Shell's C-Plan, and the plan complies with all of those detailed requirements. That Shell's C-Plan complies with each required regulatory element is evidenced throughout the document, with each section cross-referencing the federal or state regulatory provision with which it complies. For example:

- Shell's compliance with each applicable subsection of BOEM's Response Plan Requirements, 30 C.F.R. 254, Subpart B (summarized in tabular form on pages BOEMRE-1 to BOEMRE-4);
- Shell's compliance with each applicable subsection of the U.S. Coast Guard's requirements for Response Plans for Oil Facilities and Transferring Oil or Hazardous Material in Bulk, 33 C.F.R. 154 (summarized in tabular form on pages USCG-1 to USCG-3); and
- Shell's compliance with each of the requirements imposed by the Alaska Department of Environmental Conservation (ADEC) under the Alaska Administrative Code (summarized in the Table of Contents for Sections 1 through 5 on pages T-i to T-iii, Tables 1.6-4, 1.6-10, 1.6-13).

Shell's top priority in its proposed exploration program in the Beaufort Sea, and all of its drilling projects, is safe operation and the ***prevention*** of oil spills. Its C-Plan includes multiple barriers designed to prevent oil spills, loss of well control and blowouts. As part of this effort, Shell relies upon the latest drilling technologies and techniques. Although the likelihood of a very large oil spill is highly unlikely, as BOEM and NMFS have repeatedly determined, Shell's biggest safety and operational advantage here is the shallower water and lower downhole pressure at its specified drilling locations. In particular, Shell's drill locations are in approximately 150 feet of water (compared with 5,500 feet at the Macondo well in the Gulf of Mexico) and with an estimated downhole pressure of only 4,000 psi (compared with 15,000 psi at the Macondo well). Shell's specific prevention measures are detailed at length in Part 2, Response Prevention Plan, and meet all the requirements required by BOEM and the Alaska Department of Environmental Conservation (ADEC). Shell's program includes prevention-focused personnel training programs and adherence to strict procedures and management practices to prevent spills. Training drills will be conducted periodically to familiarize personnel with on-site equipment, proper deployment techniques, and maintenance procedures. The C-Plan also focuses on prevention of oil pollution and spills by employing the best control mechanisms for fuel transfer protocols and blowout prevention; rigorous equipment maintenance programs that monitor mechanical integrity and ensure prompt repairs of malfunctioning or corroded materials; well control monitoring at all phases (*i.e.,* before, during and after drilling); and emergency shutdown procedures. Shell's C-Plan also reviews the procedures to employ when operational conditions increase the risk of a well control event, such as severe weather, ice conditions, structural icing, and light conditions.

Further, as part of spill prevention efforts, Shell's blow out preventer (BOP) has been and continues to be extensively maintained, inspected, and tested by third parties. Shell's BOP is one of its key

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accordance with NTL 2010-06 for the specific wells covered in Shell's revised Chukchi Sea EP. In contrast, the very large oil spill scenario presented in the Sale 193 SEIS is only a hypothetical developed using general reservoir characteristics projected for a Chukchi Sea prospect different than those proposed by Shell for exploration drilling and used to evaluate the possible environmental impacts of that hypothetical spill simply for the purpose of determining whether to proceed with the sale.

prevention tools, and the plan includes significant enhancements to the BOP, including: more frequent subsea BOP hydrostatic tests (one every 7 days instead of every 14 days), installation of a second set of blind/shear rams in the BOP stack, and relocating the BOP stack remotely-operated vehicle (ROV) to improve accessibility.

In the event of a spill, Shell's C-Plan plans the deployment of oil spill response vessels and equipment "on the water," capable of providing an immediate response to oil spills in three discrete planning regimes: (1) a 30-day spill response scenario written in compliance with BOEM and ADEC regulations, based upon conditions likely to be encountered during the drilling season; (2) a 15-day spill response scenario written in compliance with ADEC regulations, based upon conditions likely to be encountered during the drilling season; and (3) an associated response strategy that demonstrates regional response capability under different criteria and assumptions. Shell is capable of deploying on site oil spill response assets to the spill site within one hour of notification. The C-Plan details Shell's Response Action Plan (Part 1) that is used both for training purposes and as an important guide for personnel in an emergency discharge event. Shell has also adopted an unprecedented three-tier system to respond to a spill offshore, nearshore, and onshore/shoreline with trained personnel who routinely practice using spill response drills. Shell's response assets include offshore recovery vehicles with skimmer and boom, nearshore barges with skimmer and boom, shallow water vessels with skimmer and boom, and identified protection strategies and equipment for the protection of species and sensitive environmental and cultural areas. Response assets are staffed during operation around the clock.

Shell would also like to highlight the following aspects of its oil spill response efforts that go beyond the federal and state requirements:

- Shell will have a dedicated Oil-Spill Response Barge and tug staged in the vicinity of the drilling vessel during critical drilling operations. The Oil-Spill Response Barge and tug possesses sufficient capacity to provide containment, recovery, and storage for the initial spill period.
- Shell has committed to developing and delivering a surface and subsea capping and containment system. A key element of this collection system is the capture of oil flowing from a leaking well close to the source and then piping the oil to a dedicated separation/storage equipment barge that would properly and safely dispose of all collected hydrocarbons.
- A specific relief well drilling plan for each well that will allow the drilling of a relief well to start within a few days if the original drillship is incapable of drilling its own relief well.
- Assembling the chemical, equipment, training and logistics infrastructure in place to effectively use dispersants and in-situ burning as additional response options when appropriate to supplement mechanical recovery.
- Maintaining oil spill response equipment and personnel within a few miles of the well site so that response efforts may start within one hour of any event.
- Shell's recovery capacity of the on-site pre-staged equipment listed in the C-Plan plans for 25,000 barrels of oil per day, which exceeds the WCD volumes we have modeled and vastly exceeds the State of Alaska planning standard of 5,500 barrels per day.
- Shell's storage capacity for any recovered oil exceeds all contingency planning regulations. Shell would locate some storage at the drill site or have the ability to mobilize storage to the site within one or two days.
- Employment of on-site (or early access) remote oil sensing systems that are not visibility dependent and can be used in the dark and in all weather conditions (e.g., infra-red cameras and infra-red equipped aircraft, X-band radar, SLAR equipped satellite imagery).
- A wide-range of monitoring and forecasting tools, including a customized ice and weather forecasting system geared toward Shell's operations and operating area, a 24/7 vessel tracking

and monitoring system, state-of-the art communications network, real-time monitoring of down-hole drilling conditions at multiple remote operating centers, and environmental monitoring of air, noise, and water impacts.

- Access to additional oil spill response resources, equipment and personnel, located world-wide, if necessary to respond to an actual event.

Shell is ready for exploration drilling during the open water season of 2012. Shell's comprehensive plans for exploration in the Chukchi Sea during 2012 exceed regulatory requirements, especially in regard to primary well control and oil spill response. This exploration plan, which reflects 60 years of experience conducting exploration and development drilling in the offshore (including many wells in the Beaufort and Chukchi Seas), meets the highest operational and environmental standards.

Sincerely,

Susan Child

AK Venture Support Integrator, Manager

Enclosure: Comments Specific to the Content of *Proposed Incidental Harassment Authorization* for an Exploration Drilling Program in the Chukchi Sea (pages 70004-70008; *Federal Register Vol. 76, No. 217, November 9, 2011) and* Comments on the Remainder of the Federal Register Notice for an Exploration Drilling Program in the Chukchi Sea (pages 69958—70004); *Federal Register Vol. 76, No. 217, November 9, 2011)*

Comments on FR Notice of Proposed IHA Issuance for Chukchi Sea

Comments Specific to the Content of *Proposed Incidental Harassment Authorization* for an Exploration Drilling Program in the Chukchi Sea (pages 70004-70008; *Federal Register Vol. 76, No. 217, November 9, 2011)*				
Heading/Subheading	Page	Column	FR Notice Language	Comment
Proposed Incidental Harassment Authorization	70004	R	(1) This authorization is valid from July 4, 2012 through October 31, 2012.	Within the Summary of Request section of the proposed notice, NMFS' summarizes Shell's plans to drill on OCS leases offshore in the Chukchi Sea during the 2012 Arctic open-water season. Given that Shell commits to not entering the Chukchi Sea before July 1, 2012, we could arrive at the Burger Prospect and initiate drilling activities prior to July 4th, therefore Shell asks that the timeframe for activation of the IHA begin at least on July 1st.
Proposed Incidental Harassment Authorization	70004	R	(2) This Authorization is valid only for activities associated with Shell's 2012 Chukchi Sea exploration drilling program. The specific areas where Shell's exploration drilling program will be conducted are within Shell lease holdings in the Outer Continental Shelf Lease Sale 193 area in the Chukchi Sea.	The proposed authorization for takes by incidental harassment includes acoustic sources related to continuous drillship sounds, sounds due to ice management, and those from the air gun array for the zero offset vertical seismic profile (ZVSP). Ice management may take place beyond the boundaries of Shell lease holdings in order to maintain the safety and security of the drillship during its operations on location. Also, the continuous drillship sounds (at 120 dB) may extend beyond the limit of Shell leas holdings. Therefore, 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.
Proposed Incidental Harassment Authorization	70004	R	(3)(a) The incidental taking of marine mammals, by Level B harassment only, is limited to the following species: bowhead whale; gray whale; beluga whale; minke whale; fin whale; humpback whale; killer whale; harbor porpoise; ringed seal; bearded seal; spotted seal; and ribbon seal.	Shell's IHHA also included a request for incidental take of the narwhal. Shell concedes this is a rare species; however, it is often that Shell hears from subsistence hunters in Alaska that they have seen a narwhal in the Arctic Ocean. Shell asks that the narwhal be included in the incidental take authorization in the off-chance that one is observed within the ensonified area of an activity authorized by this IHA.
Proposed Incidental Harassment Authorization	70005	L	(7)(a) All vessels shall reduce speed to at least 9 knots when within 300 yards (274 m) of whales. The reduction in speed will vary based on the situation but must be sufficient to avoid interfering with the whales. Those vessels capable of steering around such groups should do so. Vessels may not be operated in such a way as to separate members of a group of whales from other members of the group;	Shell asks whether the response we provided to NMFS on July 29, 2011 for a definition of "group" is consistent with the intent meant by NMFS in this FR notice. That response in its entirety is: **Shell's voluntary mitigation measure does not define the term in question. Shell echoes NMFS' use of the term "groups" that has been included in each IHA issued to Shell by NMFS for marine seismic surveys and exploration drilling since 2007, see under Section 6 Mitigation, (a) General Mitigation (i) and (ii). As a general practice, Shell will adopt a definition of a group as being three or more whales observed within a 500 meter area and displaying behaviors of directed or coordinated activity, e.g. group feeding.**
Proposed Incidental Harassment Authorization	70005	L	(7)(d) Aircraft shall not fly within 1,000 ft (305 m) of marine mammals or below 1,500 ft (457 m) altitude (except during takeoffs, landings, or in emergency situations) while over land or sea;	Shell asks that general mitigation (7)(e) be modified to apply to all "non-MMO" flights, thus allowing for MMO flights to fly lower as needed to afford the best possible marine mammal sightings and identification. Shell points out that in item (9) (f) of the proposed IHA language (page 70006), NMFS appropriately describes that this mitigation applies to aircraft, "unless engaged in marine mammal monitoring,".
Proposed Incidental Harassment Authorization	70005	L/C	(7)(e)…drillship **or support vessel**... PSO shifts shall last no longer than 4 hours at a time and shall not be on watch more than 12 hours in a 24-hour period…..	Shell's view is that this general mitigation and the length of daily duty restrictions included in this mitigation, applies only to the drilling vessel and ice management vessels. Given the operations of these vessel and length of daily duty restrictions, these vessels will have 5 MMOs on-board. Shell's

				view is that the remainder of support vessels, not included as "sound sources" will have fewer MMOs than either the drilling vessel or ice management vessels, which will be sufficient to cover marine mammal observations.
Proposed Incidental Harassment Authorization	70005	C	(7)(f)(iv) The ship's position, speed of support vessels, and **water temperature**….	Shell asks what is the benefit and purpose for recording water temperature among the "sighting conditions" criteria? It will be difficult to obtain water temperature readings from some vessels, particularly at the frequency cited in the mitigation. Further, the depth of water temperature recording may vary significantly between vessels making comparison, if intended, of questionable value. Measurement of water temperature from some vessels may require variances from safety measures in force on vessels. Shell requests that the water temperature measurement be removed as a stipulation under this mitigation, given that it lacks a material value to the recording of marine observations and adherence to other more salient mitigation measures.
Proposed Incidental Harassment Authorization	70006	L/C	(9)(a)….As soon as the fleet transits past the ice, it will exit the polynya zone and continue a path in the open sea **toward the Camden Bay drill sites**;	For the Chukchi Sea exploration drilling program the vessels will continue to the Burger Prospect in the Chukchi, not toward the Camden Bay drill sites.
Proposed Incidental Harassment Authorization	70006	C	(9)(f) Not operate aircraft below 1,500 ft (457 m) unless engaged in marine mammal monitoring, approaching, landing or taking off, or unless engaged in providing assistance to a whaler or in poor weather (low ceilings) or any other emergency situations;	NMFS appropriately describes that flight altitude restriction does not apply to aircraft involved in marine mammal monitoring.
Proposed Incidental Harassment Authorization	70006	C/R	(10)(c)(i) Holder of this Authorization is required to conduct sound source verification tests for the drilling vessel, support vessels, and the airgun array……. The test results shall be reported to NMFS within 5 days of completing the test. Also, (11)(a) *Reporting Requirements:* The Holder of this Authorization is required to: (a) Within 5 days of completing the sound source verification tests for the drillship, support vessels, and the airguns, the Holder shall submit a preliminary report of the results to NMFS.	Sound source verification 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. The frequency of this "rolling" transmission can be decided via further consultation with NMFS and perhaps with the input from peer review of the 4MP. Shell requests that the eventual IHA incorporate language that reflects the flexibility of providing the drilling sounds on this "rolling" basis.
Proposed Incidental Harassment Authorization	70006	R	(10)(ii) Acoustic ''Net'' Array: Deploy acoustic recorders widely across the U.S. Chukchi Sea and on the prospect in order to gain information on the distribution of marine mammals in the region. This program must be implemented as detailed in the 4MP.	Shell asks that the phrase, "To the extent practical, "precede the last sentence of this monitoring requirement. 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. As such, Shell asks that the eventual IHA note this flexibility around such an undesired outcome.
Proposed Incidental Harassment Authorization	70007	L	(11)(d) A draft comprehensive report describing the aerial, acoustic, and vessel-based monitoring programs will be prepared and submitted **within 240 days of the date of this Authorization**.	Shell asks that the eventual IHA not stipulate that the comprehensive report be due within 240 days from the date of the Authorization. It is Shell's hope that the Authorization will be received well in advance of the initiation of drilling related activities, so as to allow for needed planning and investment. If such is the case, such early approval would start the clock on the 240 days without an opportunity within that time to collect or process data. At a minimum, the due date for the comprehensive report should not start until the end of the 2012 exploration drilling program, at which time the data that will support the report will have been collected and are

				available for processing.
Comments on the Remainder of the Federal Register Notice for an Exploration Drilling Program in the Chukchi Sea (pages 69958—70004); *Federal Register Vol. 76, No. 217, November 9, 2011)*				
Heading/Subheading	Page	Column	FR Notice Language	Comment
SUMMARY:	69958	L	NMFS received an application from Shell Offshore Inc. (Shell) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to offshore exploration drilling on Outer Continental Shelf (OCS) leases in the Chukchi Sea, Alaska.	This application was submitted by Shell Gulf of Mexico Inc.
Description of the Specified Activity and Specified Geographic Region	69959	L	…It is an anchored drillship with an 8-point anchored mooring system and would likely have a maximum anchor radius of 2,969–2,986 ft (905–910 m) at either the Sivulliq or Torpedo drill sites…	The anchor radii for the *Discoverer* is for it being anchored in Camden Bay, at the drill sites (Sivulliq and Torpedo) included in the Camden Bay drilling IHA application. The anchor radii for it in the Chukchi Sea are 2,609-2904 ft (795-885 m) for the Burger Prospect drill sites.
Exploratory Drilling Program and Potential for Oil Spill	69976-69980	L(69976) L(69980)	Multiple Pages – not repeated here.	Shell appreciates NMFS' conclusion of no reasonable likelihood of serious injury or mortality to marine mammals from an oil spill during Shell's 2012 Chukchi Sea exploration drilling program. In this FR notice, NMFS conducts a thorough and thoughtful assessment of the low likelihood of a large or very large oil spill given the robust design standards and practices that Shell will implement during this drilling program, beyond the already low probability of an oil spill even occurring during the drilling of any offshore well. Within the FR notice NMFS also conducts an appropriate assessment of the impacts to its jurisdictional species from an oil spill, even despite its conclusion that the occurrence of an oil spill is extremely remote. Each of these items is thoroughly assessed by NMFS and the appropriate conclusions are drawn by NMFS in the FR notice.
Mitigation Measures Proposed by Shell	69986	C	…(3) implementing flight restrictions prohibiting aircraft from flying below 1,500 ft (457 m) altitude (except during takeoffs and landings or in emergency situations);…	Shell committed mitigation applies to all "non-MMO" flights, thus allowing for MMO flights to fly lower as needed to afford the best possible marine mammal sightings and identification.
Additional Mitigation Measures Proposed by NMFS	69986	R	In addition to the mitigation measures proposed by Shell, NMFS proposes the following measures (which apply to vessel operations) be included in the IHA, if issued, in order to ensure the least practicable impact on the affected species or stocks. NMFS proposes to require Shell to avoid multiple changes in direction or speed when within 300 yards (274 m) of whales.	This mitigation measure was committed to by Shell in the IHA application.
Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses	70001	R	…Wainwright is the coastal village closest to the proposed drill site and is located approximately 78 mi (125.5 km) from Shell's Burger prospect. Point Lay, Barrow, and Point Hope are all approximately 92, 140, **and 180 mi** (148, 225.3, and 290 km), respectively, from Shell's Burger prospect.	Shell's Burger Prospect is approximately 206 miles from the community of Point Hope.