

**ALASKA WILDERNESS LEAGUE—AUDUBON ALASKA—CENTER FOR
BIOLOGICAL DIVERSITY—DEFENDERS OF WILDLIFE—EARTHJUSTICE
FRIENDS OF THE EARTH—NATURAL RESOURCES DEFENSE COUNCIL
NORTHERN ALASKA ENVIRONMENTAL CENTER—OCEAN CONSERVATION
RESEARCH—OCEANA—PACIFIC ENVIRONMENT—SIERRA CLUB
THE WILDERNESS SOCIETY—WORLD WILDLIFE FUND**

Feb. 28, 2012

VIA EMAIL

Jim Lecky,
National Marine Fisheries Service, Office of Protected Resources
1315 East-West Highway
Silver Spring, MD 20910
Email: arcticeis.comments@noaa.gov

Re. National Marine Fisheries Service's Draft Environmental Impact Statement for the Effects of Oil and Gas Activities in the Arctic Ocean, 76 Fed. Reg. 82,275 (Dec. 30, 2011)

Dear Mr. Lecky:

We continue to support the National Marine Fisheries Service (NMFS) in its effort to complete the long-standing process to develop a programmatic Environmental Impact Statement (EIS) for oil and gas exploration in the Arctic Ocean. A comprehensive, long-term overview is necessary in order to adequately capture the potential effects of increasing industrial activity on the people, marine life, and ecology of the area. We are greatly concerned, however, with the direction of the draft EIS.

The scope of annual activity contemplated by the draft EIS is staggering, with up to twenty-one surveys, four exploration drilling programs, and dozens of support vessels – including icebreakers – operating at any given time. Yet in many respects the analysis in the draft EIS simply duplicates the existing project-by-project review in a different format with little in the way of reliably protective mitigation measures. A number of systemic failings compromise its findings: a failure to adequately consider missing information; a failure to provide even the most rudimentary quantitative analysis of marine mammal takes; a failure to examine the effects of multiple concurrent and cumulative disturbances on vulnerable species; and a failure to incorporate the leading science on noise, disturbance, and emerging technologies.

Critically, the selection of alternatives and assessment of effects in the draft EIS fall short because they do not assist decisionmakers in determining what measures can be taken to reduce impacts and what choices may be preferential from an environmental standpoint. Instead, each alternative is presented as resulting in virtually the same impact, and there is no indication of what scenario – either activity level or location – would be cause for greater concern. This is contrary not only to existing science, but it flouts the fundamental purposes of NEPA.

This EIS process is an opportunity to create a forward-thinking approach for managing oil and gas activities in the Arctic. When previously confronted with enormous data gaps and a statutory mandate to sustainably manage a resource, NMFS took a “precautionary, ecosystem-based approach” and prohibited activities until sufficient information exists.¹ The same precautionary, ecosystem-based approach should prevail here as well. As it stands, we support the no action alternative and provide the following comments for NMFS to consider as it moves forward.

I. FAILURE TO ADEQUATELY CONSIDER MISSING INFORMATION

It is undisputed that there are significant gaps in basic information about the Arctic Ocean, its wildlife, and the potential effects of noise and disturbance from oil and gas exploration. The pressing need for more information has been acknowledged repeatedly in recent years by both NMFS and the Bureau of Ocean Energy and Management (BOEM).² It has also been affirmed by others sources, including in the recent analysis by United States Geological Survey intended specifically to review existing data gaps in the Arctic.

NEPA regulations set out an “ordered process” for an agency preparing an EIS in the face of missing information.³ When there is incomplete information relevant to reasonably foreseeable significant adverse impacts that is essential to a reasoned choice among alternatives, an agency must obtain and include the missing information in the EIS if the overall costs of obtaining it are not exorbitant.⁴ If the costs are exorbitant or the means to obtain the information are unknown, agencies must provide in the EIS a number of responses including, a “summary of existing credible scientific evidence” and an evaluation of impacts “based upon theoretical approaches or research methods generally accepted in the scientific community.”⁵

The regulation furthers NEPA’s purpose of ensuring that agencies make “fully informed and well-considered decision[s] . . . ,”⁶ its mandate of “widespread discussion and consideration of the environmental risks and remedies associated with [a] pending project”, and its “require[ment] that this evaluation take place *before* a project is approved.”⁷

The draft EIS cites to the applicable Council of Environmental Quality (CEQ) regulation and maintains that it identifies those areas “where information is unavailable to support a thorough evaluation of the environmental consequences of the alternatives.”⁸ Where data gaps exist, the draft EIS purports to provide the information required by the regulation.⁹ The draft

¹ 74 Fed. Reg. 56,734, 56,734 (Nov. 3, 2009).

² Throughout the development of an EIS for Arctic oil and gas activities, BOEM has undergone a number of reorganizations and name changes. For the sake of simplicity, it is referred to as BOEM in this document, except when a previous name is used to identify the source of a document. BOEM is a cooperating entity on the EIS, but because NMFS is the lead agency, these comments are often directed to it.

³ *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1244 (9th Cir. 1984).

⁴ 40 C.F.R. § 1502.22.

⁵ *Id.* § 1502.22(b).

⁶ *Vt. Yankee Nuclear Power Corp. v. Natural Resources Def. Council*, 435 U.S. 519, 558 (1978).

⁷ *LaFlamme v. FERC*, 852 F.2d 389, 398 (9th Cir. 1988) (internal quotation marks omitted).

⁸ National Marine Fisheries Service (NMFS), Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement (EIS) at 4-3 (Dec. 2011) (DEIS).

⁹ *Id.*

EIS, however, does not consistently apply section 1502.22. It ignores NMFS and BOEM's previous conclusions as to their inability to make informed decisions as to potential effects. It acknowledges information gaps without applying the CEQ framework. And it disregards multiple sources that highlight additional fundamental data gaps concerning the Arctic and the effects of oil and gas disturbance.

A. Unjustified findings of sufficient information

The draft EIS contains a number of instances in which it acknowledges major information gaps related to marine mammals but insists that there is an adequate basis for making an assessment of impacts. For example, the draft EIS finds that it "is not known whether impulsive sounds affect reproductive rate or distribution and habitat use [of bowhead whales] over periods of days or years."¹⁰ Moreover, the potential "for increased stress, and the long-term effects of stress, are unknown, as research on stress effects in marine mammals is limited[.]"¹¹ Nevertheless, the draft EIS concludes that for bowheads the "level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type."¹² The draft EIS also maintains that sufficient information exists to evaluate impacts on walrus and polar bear despite uncertainties about their populations.¹³

Yet elsewhere NMFS has recognized without better data, it is difficult to make the findings that are legally required to authorize marine mammal harassment.¹⁴ 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."¹⁵ Moreover, the data to describe marine mammals and their habitat in the Arctic "are lacking or inadequate to support impact assessment and mitigation planning."¹⁶ NMFS's earlier conclusions are at odds with the statements in the draft EIS about missing information.

¹⁰ *Id.* at 4-100.

¹¹ *Id.* A study on ship noise and marine mammal stress was recently issued. Rolland, R.M., Parks, S.E., Hunt, K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K., and Kraus, S.D., Evidence that ship noise increases stress in right whales, *Proceedings of the Royal Society B: Biological Sciences* doi:10.1098/rspb.2011.2429 (2012).

¹² DEIS at 4-100. Elsewhere, the draft EIS states that long term effects of disturbance on bowheads is "not well understood." *Id.* at 4-479; *see also id.* at 4-105 (long-term effects of vessels and aircraft on bowheads is "unknown"). Potential "long-term effects from repeated disturbance, displacement or habitat disruption on an extremely long-lived species such as the bowhead whale are unknown." *Id.* at 4-110; 4-255 (same); 4-256 (same); 4-480 (same); 4-259 (same); other cetaceans).

¹³ DEIS at 3-116; 3-119. The draft EIS also asserts that the utility of such information is further reduced because the impacts are "common" to all alternatives. *See, e.g., id.* at 3-119. As discussed throughout these comments, the alternatives under consideration should, in fact, result in varying degrees of impact, and to the extent that they do not, the draft EIS must develop alternatives that do.

¹⁴ NMFS, Comments on Minerals Management Service (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 (Jan. 30, 2007) (NMFS LS 193 Cmts); NMFS, Comments on MMS Draft EIS for the Beaufort Sea and Chukchi Sea Planning Areas – Oil and Gas Lease Sales 209, 212, 217, and 221 at 3-5 (March 27, 2009) (NMFS Multi-Sale Cmts).

¹⁵ 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).

¹⁶ NMFS Multi-Sale Cmts at 3; *see also id.* at 4 (uncertain status and trend of the marine mammal populations inhabiting the proposed lease sale areas will make it difficult to detect and quantify any population level effects").

Similarly, although the draft EIS takes note of some of the missing information related to the effects of noise on fish, it maintains that what does exist is sufficient to make an informed decision.¹⁷ BOEM's original draft supplemental EIS for lease sale 193, however, observed that "experiments conducted to date have not contained adequate controls to allow us to predict the nature of the change or that any change would occur."¹⁸ NOAA subsequently submitted comments noting that BOEM's admission indicated that the "next step would be to address whether the cost to obtain the information is exorbitant, or the means of doing so unclear."¹⁹

The draft EIS also acknowledges that robust population estimates and trends for marine fish are unavailable and detailed information concerning their distribution is lacking.²⁰ Yet the draft EIS asserts that "[g]eneral population trends and life histories" are sufficiently understood to conclude that impacts on fish resources would be "negligible."²¹ As recently as 2007, BOEM expressed stronger concerns when assessing the effects of a specific proposal for two drillships operating in the Beaufort Sea. It found that it could not "concur that the effects on all fish species would be 'short term' or that these potential effects are insignificant, nor would they be limited to the ' . . . localized displacement of fish . . . '", because they could persist for up to five months each year for three consecutive years and they could occur during critical times in the life cycle of important fish species.²² The agencies' prior conclusions are equally applicable in the context of this draft EIS.²³

B. Additional areas of missing information

¹⁷ DEIS at 4-73 (despite the need for further study on the effects of oil and gas activities, "enough information exists to perform a full analysis").

¹⁸ Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, Draft Supplemental EIS, OCS EIS/EA BOEMRE 2010-034, App. A at 46 (Sept. 2010) (LS 193 DSEIS), *available at* http://www.alaska.boemre.gov/ref/EIS%20EA/2010_034.pdf; *see also* MMS, Beaufort Sea and Chukchi Sea Planning Areas, Oil and Gas Lease Sales 209, 212, 217, and 221, Draft EIS, OCS EIS/EA MMS 2008-0055at 4-64 (Nov. 2008) (2008 Multi-Sale DEIS), *available at* http://www.alaska.boemre.gov/ref/EIS%20EA/ArcticMultiSale_209/2008_0055_deis/vol2.pdf.

¹⁹ NMFS, Comments on BOEMRE Draft Supplemental EIS for the Chukchi Planning Area – Oil and Gas Lease Sale in the Chukchi Sea at 5 (Feb. 28, 2011) (NMFS LS 193 2011 Cmts); *see also* NMFS LS 193 Cmts at 2-3; NMFS Multi-Sale Cmts at 16.

²⁰ DEIS at 3-63. The data gaps for fish inhabiting the near-shore are at least equally profound. *Id.*

²¹ *Id.* at 4-77.

²² MMS, Shell Offshore Inc. Beaufort Sea Exploration Plan, Environmental Assessment, OCS EIS/EA MMS 2007-009 at 50-51 (Feb. 2007) (2007 Drilling EA), *available at* http://www.alaska.boemre.gov/ref/EIS%20EA/ShellOffshoreInc_EA/SOI_ea.pdf. BOEM avoided looking more closely at the issue by resting on a significance threshold that required effects to extend beyond multiple generations. The issue of an appropriate significance threshold in the draft EIS is discussed in the text, *infra*. A panel of the Ninth Circuit determined that the uncertainty required BOEM to obtain the missing information or provide a convincing statement of its conclusion of no significant impacts notwithstanding the uncertainty. *Alaska Wilderness League v. Salazar*, 548 F.3d 815, 831 (9th Cir. 2008), *opinion withdrawn*, 559 F.3d 916 (9th Cir. Mar 06, 2009), *vacated as moot*, 571 F.3d 859 (9th Cir. 2009).

²³ Courts have also made clear that "without establishing . . . baseline conditions . . . there is simply no way to determine what effect [an action] will have on the environment, and consequently, no way to comply with NEPA." *Half Moon Bay Fisherman's Mktg. Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988).

Throughout the draft EIS, there are additional acknowledgements of missing information, but without any specific findings as to the importance to the agencies' decisionmaking, as required by section 1502.22, including:

Foraging movements of pack-ice breeding seals are not known.²⁴

There are limited data as to the effects of masking.²⁵ The “greatest limiting factor in estimating impacts of masking is a lack of understanding of the spatial and temporal scales over which marine mammals actually communicate[.]”²⁶

It is not known whether impulsive noises affect marine mammal reproductive rate or distribution.²⁷

It is “not currently possible to predict which behavioral responses to anthropogenic noise might result in significant population consequences for marine mammals, such as bowheads, in the future.”²⁸

The potential long-term effects on beluga whales from repeated disturbance are unknown.²⁹ Moreover, the current population trend of the Beaufort Sea stock of beluga whales is unknown.³⁰

The “degree to which ramp-up protects marine mammals from exposure to intense noises is unknown.”³¹

Chemical response techniques to address an oil spill, such as dispersants, “could” result in additional degradation of water quality, which “may or may not” offset the benefits of dispersant use.³²

A number of entities have also taken note of the data gaps as to both baseline information for Arctic species and the effects of noise and disturbance.³³ Recently, the United States

²⁴ DEIS at 3-108.

²⁵ *Id.* at 4-88.

²⁶ *Id.*

²⁷ *Id.* at 4-89.

²⁸ *Id.* at 4-110 – 4-111.

²⁹ *Id.* at 4-258; *see also id.* at 4-114 (same); 4-115 (same); 4-299 (same); 4-332 (same).

³⁰ *Id.* at 4-483.

³¹ *Id.* at 4-142; *see also id.* (seals); 4-143 (walrus and polar bear). The draft EIS also asserts the effect of discharges on marine mammal habitat is “unknown” but that gathering information would be cost prohibitive. *Id.* at 4-128 (seals); 4-133 (walrus); 4-266 (polar bear). The CEQ regulations, however, require that an EIS at least attempt an analysis “based upon theoretical approaches or research methods generally accepted in the scientific community.” 40 C.F.R. § 1502.22(b)(4).

³² DEIS at 4-370; 4-413 (same).

³³ *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), *available at* <http://www.whitehouse.gov/sites/default/files/microsites/ostp/oceans-mmnoise-IATF.pdf>, (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*

Geological Survey (USGS) found that basic 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.³⁴ The need for such fundamental information is apparent even for bowhead whales, one of the better studied species in the Arctic.³⁵ 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.³⁶ Recognizing the scope and importance of the data gaps, the report states that missing information serves as a “major constraint to a defensible science framework for critical Arctic decision making.”³⁷

The final supplemental EIS for lease sale 193 contains similar findings. For example, BOEM found that it lacked the information to determine where bowhead aggregations occur in the Chukchi Sea.³⁸ It further acknowledged that much of the information on the distribution and timing of movements of belugas is missing, particularly for late summer and fall during the open-water period when lease sale activities like seismic surveying and exploration drilling would take place.³⁹

The draft EIS reveals in many instances that studies are in fact already underway, indicating that the necessary information gathering is not cost prohibitive. A study undertaken by BP, the North Slope Borough, and the University of California “will help better understand

Water: The Gulf Oil Disaster and the Future of Offshore Drilling, Report to the President at vii (Jan. 2011), available at

http://www.oilspillcommission.gov/sites/default/files/documents/DEEPWATER_ReporttothePresident_FINAL.pdf (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, available at

http://www.oilspillcommission.gov/sites/default/files/documents/Offshore%20Drilling%20in%20the%20Arctic_Background%20and%20Issues%20for%20the%20Future%20Consideration%20of%20Oil%20and%20Gas%20Activities_0.pdf (listing acoustics research on impacts to marine mammals as a “high priority”).

³⁴ Holland-Bartels, Leslie, and Pierce, Brenda, eds., 2011, An evaluation of the science needs to inform decisions on Outer Continental Shelf energy development in the Chukchi and Beaufort Seas, Alaska: U.S. Geological Survey Circular 1370 (USGS Report), available at <http://pubs.usgs.gov/circ/1370/>. See also *id.* at 57 (walrus); 184 (Finding 6.12, beluga whales); 185 (Finding 6.13, gray whales); 187 (Finding 6.15, ice seals). Although the draft EIS cites to the USGS report, it does not discuss its findings in the context of missing information.

³⁵ *Id.* at 52, 179-182.

³⁶ *Id.* at 176.

³⁷ *Id.* at 23.

³⁸ BOEMRE, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, Final Supplemental EIS, OCS EIS/EA BOEMRE 2011-041 at IV-101 (Aug. 2011) (LS 193 FSEIS), available at http://alaska.boemre.gov/ref/EIS%20EA/2011_041_FSEIS/2011_041x.htm (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).

³⁹ *Id.* at III-77. BOEM has, however, 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.

masking and the effects of masking on marine mammals[.]”⁴⁰ It will also address ways to overcome the “inherent uncertainty” of where and when animals may be exposed to anthropogenic noise by developing a model for migrating bowheads.⁴¹ NOAA has convened working groups on Underwater Soundmapping and Cetacean Mapping in the Arctic.⁴² BOEM has an Environmental Studies Program that includes a number of ongoing and proposed studies in the Beaufort and Chukchi seas that are intended to address a wide-variety of issues relevant to the draft EIS.⁴³ As the Ninth Circuit recently found, agencies have an obligation pursuant to NEPA “to ensure that data exists *before approval*” so that decisionmakers can “understand the adverse environmental effect *ab initio*.”⁴⁴

II. FAILURE TO ADEQUATELY DEFINE IMPACT LEVELS

For each resource, the draft EIS provides specific impact criteria.⁴⁵ These criteria are then used to determine whether the overall effect on the resource qualifies as “negligible,” “minor,” “moderate,” or “major.”⁴⁶ As the ultimate measure of potential effects, these descriptors are problematic: they do not inform the relevant agencies as to how impacts relate to their substantive statutory responsibilities, and they do not provide adequate information as to their relationship to the NEPA significance threshold.

A. Alignment with substantive legal standards

As recognized by the agencies, the draft EIS is intended to provide the information necessary for NMFS to comply with the Marine Mammal Protection Act (MMPA) and for BOEM to comply with the Outer Continental Shelf Lands Act (OCSLA).⁴⁷ This approach comports with applicable caselaw. The Ninth Circuit has observed that, when an action is taken pursuant to a specific statute, not only do “the statutory objectives of the project serve as a guide by which to determine the reasonableness of objectives outlined in an EIS,” but “the statutory objectives underlying the agency’s action work significantly to define its analytic obligations.”⁴⁸ Consequently, “the considerations made relevant by the substantive statute driving the proposed action *must be addressed* in NEPA analysis.”⁴⁹ Indeed, agencies are required by NEPA to explain how alternatives in an EIS will meet requirements of “other environmental laws and polices.”⁵⁰

⁴⁰ DEIS at 4-88.

⁴¹ *Id.* at 4-469.

⁴² *Id.* at ES-34.

⁴³ *Id.* 5-8 – 5-9.

⁴⁴ *Northern Plains Resource Council v. Surface Transport. Bd.*, --- F.3d ----, 2011 WL 6826409, *14 (9th Cir. Dec. 29, 2011) (emphasis in original). *See also* *Ctr. for Biological Diversity v. Bureau of Land Management*, 422 F. Supp. 2d 1115, 1166 (N.D. Cal. 2006) (Section 1502.22 requires an agency to “demonstrate” that the costs of obtaining missing, essential information are exorbitant).

⁴⁵ *See, e.g.*, DEIS at 4-85 – 4-86 (Table 4.5-19, providing impact criteria for marine mammals).

⁴⁶ *Id.* at 4-4.

⁴⁷ *See id.* at 1-10.

⁴⁸ *Oregon Natural Desert Ass’n v. BLM*, 625 F.3d 1092, 1109 (9th Cir. 2010).

⁴⁹ *Id.* (emphasis added; footnote omitted); *id.* at 1109 n.11 (“the factors to be considered are derived from the statute the major federal action is implementing, as well as from the nature of the action itself”).

⁵⁰ *See* 40 C.F.R. § 1502.2(d).

While the draft EIS attempts to address the relevant subject matter implicated by the governing statutes (e.g., marine mammals and the ocean environment), its impact descriptors bear no resemblance to the standards imposed by the MMPA and OCSLA.⁵¹ The draft EIS does not provide, for example, the necessary information to determine whether any of the proposed alternatives will have a more than negligible impact on any marine mammal stock and whether there may be undue harm to aquatic life.⁵² The statutes' substantive requirements are by no means the only yardstick by which to measure effects in the NEPA analysis, but their requirements should be integrated to a greater degree. The 2006 programmatic environmental assessment for seismic surveying achieved this goal by incorporating elements of the MMPA's "potential biological removal" to determine the number of harassed whales that could affect the population's rates of survival and recruitment.⁵³

NMFS itself included an analogous recommendation in its comments to the draft supplemental EIS for lease sale 193. Due to the potential for effects on Essential Fish Habitat, NMFS indicated that BOEM's NEPA documentation should in the future "use [the] exact terminology" from the Magnuson-Stevens Fisheries Act and its regulations rather than terms such as "negligible" and "minor."⁵⁴ Doing so, NMFS maintained, would help to avoid confusion between the agencies and better inform the public.⁵⁵

B. Relationship to NEPA significance

Furthermore, the draft EIS's approach avoids articulating any thresholds for "significance," the point at which NEPA requires the preparation of an EIS. Although a defined threshold is particularly needed when an agency prepares an EA, it has consequences here given the programmatic nature of the Arctic EIS. NMFS may later incorporate portions of the EIS by reference, and under such circumstances, it will be critical to understand the import of the analysis within the context of an established threshold.⁵⁶ BOEM or other agencies may incorporate analysis from the EIS as well.

The existing impact criteria and impact levels, unfortunately, obscure rather than illuminate the potential for harm. A "major" impact is one that is "generally medium or high intensity, long-term or permanent in duration, a regional or state-wide extent, and affect important or unique resources."⁵⁷ For marine mammals, that would demand an alternation of behavior patterns for several years and potentially affecting the resource throughout the entire

⁵¹ For example, the draft EIS makes a point to note that the term "negligible" as used in the document does not have the same meaning as used in the MMPA. DEIS at 4-4 n.1.

⁵² 16 U.S.C. § 1371(a)(5)(D)(i)(I) (MMPA); 43 U.S.C. § 1340(a)(1) & (g)(3) (OCSLA). *See also* 30 C.F.R. § 551.6(a). The draft EIS 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. *See* 50 C.F.R. § 216.102.

⁵³ MMS, Final Programmatic Environmental Assessment, Arctic Outer Continental Shelf Seismic Surveys – 2006, OCS EIS/EA MMS 2006-038 at 36-37 (June 2006) (2006 PEA), *available at* http://www.alaska.boemre.gov/ref/EIS%20EA/Final_PEA/Final_PEA.pdf.

⁵⁴ NMFS LS 193 2011 Cmts at 4.

⁵⁵ *Id.*

⁵⁶ DEIS at 5-2.

⁵⁷ *Id.* at 4-4.

two-sea EIS project area.⁵⁸ This, however, does not fit comfortably with the draft EIS’s warnings that displacement from important habitat lasting even a matter of weeks can result in harm of biological significance to marine mammals.⁵⁹

A well-reasoned significance threshold is especially important here given that there have been conflicting definitions of significance in recent NEPA documents related to the Arctic.⁶⁰ NMFS, as an expert wildlife agency and the lead for the draft EIS, should take the opportunity to delineate the appropriate boundaries for assessing the impacts. Doing so will better inform both the public and decisionmakers as to the appropriate backdrop for future exploration activities.

III. FAILURE TO CONSIDER A REASONABLE RANGE OF ALTERNATIVES

The purpose of an EIS is to “rigorously explore and objectively evaluate all reasonable alternatives” to the proposed action.⁶¹ That discussion of alternatives “is the heart of the [EIS],”⁶² and it “guarantee[s] that agency decision-makers have before them and take into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance.”⁶³ These standards have not been met here.

A. Unjustified dismissal of alternatives

The draft EIS improperly dismisses three effective alternatives on the erroneous belief that they exceed the agencies’ present capacity or legal authority to impose.

- (1) Activity caps.— As NMFS has recognized, oil and gas-related disturbances in the marine environment can result in biologically significant impacts depending upon the “timing, location, *and number*” of the activities.⁶⁴ Yet the draft EIS declines even to consider an alternative limiting the amount of activity that can be conducted in the Arctic, or part of the Arctic, over a given period. The agencies base their rejection of this alternative not on the grounds

⁵⁸ *Id.* at 4-85. In order to diminish the degree of harm, the draft EIS also repeatedly notes that the affected marine mammals are unlikely to “leave the EIS project area entirely[.]” an observation of questionable relevance under any circumstance but particularly so given the size of the EIS project area at issue here. *Id.* at 4-100 (bowheads); 4-105 (same); 4-255 (same); *see also id.* at 4-259 (other cetaceans).

⁵⁹ *Id.* at 4-121; 4-114. *See Sierra Club v. Mainella*, 459 F. Supp. 2d 76, 106 (D.D.C. 2006) (faulting an agency for failing to explain “the basis for its conclusion that potentially ‘moderate’ impacts could not be significant under NEPA”).

⁶⁰ Compare PEA-35 with MMS, Beaufort Sea Planning Area, Oil and Gas Lease Sales 186, 195, and 202, Final EIS, OCS EIS/EA MMS 2003-001 at IV-4 (Feb. 2003) (2003 Multi-Sale FEIS).

⁶¹ 40 C.F.R. § 1502.14(a).

⁶² *Id.* § 1502.14

⁶³ *Alaska Wilderness Recreation & Tourism Ass’n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995) (quoting *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1228 (9th Cir. 1988)); *see also Angoon v. Hodel*, 803 F.2d 1016, 1020 (9th Cir. 1986) (“[T]he touchstone for our inquiry is whether an EIS’s selection and discussion of alternatives fosters informed decision-making and informed public participation.”) (quoting *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982)).

⁶⁴ NMFS, Biological Opinion for Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska and Authorization for Small Takes Under the Marine Mammal Protection Act at 86 (July 17, 2008) (2008 BiOp).

that it exceeds their legal authority, but that it does not meet the purpose and need of the EIS.⁶⁵

In fact, determining the legally acceptable limits of activity is essential to NMFS's issuance of take authorizations in the Arctic – which is the agency's stated purpose and need.⁶⁶ Pursuant to NMFS's own general regulations, an incidental harassment authorization must be revoked if the authorized takings “individually or in combination with other authorizations” are having more than a negligible impact on the population or an unmitigable adverse impact on subsistence.⁶⁷ Unfortunately, the draft EIS makes no attempt to assess whether the scope of activities it contemplates satisfies the negligible impact standard, or even to quantify the amount of take that would occur (see *infra*). Similarly, considering limits on activities is essential to BOEM's permitting and other requirements under OCSLA.⁶⁸

Instead of developing an activity cap alternative for the EIS, the agencies propose, in effect, to consider overall limits on activities when evaluating individual applications under OCSLA and the MMPA.⁶⁹ It would, however, be much more difficult for NMFS or BOEM to undertake that kind of analysis in an individual IHA application or OCSLA exploration plan because the agencies often lack sufficient information before the open water season to take an overarching view of the activities occurring that year. Determining limits at the outset would also presumably reduce uncertainty for industry. In short, excluding any consideration of activity caps from the alternatives analysis in this EIS frustrates the purpose of programmatic review, contrary to NEPA.⁷⁰

- (2) Permanent area closures.— As noted *infra*, it is broadly recognized that area closures represent the most effective available means of reducing harm from various anthropogenic noise sources on marine mammals, and that closures can also reduce the risk of ship-strikes of cetaceans and the impact of oil spills on wildlife. But the draft EIS rules out any consideration of permanent area closures, arguing the agencies' lack authority under the MMPA and OCSLA to prescribe them.⁷¹ Indeed, it suggests that the proper time for consideration of permanent closures is during the offshore leasing program and lease sale processes.⁷²

BOEM's relegation of this alternative to the leasing process is not consistent with its obligation, at the exploration and permit approval stage, to reject

⁶⁵ DEIS at 2-45.

⁶⁶ DEIS at 1-3 to 1-4.

⁶⁷ 50 C.F.R. § 216.107(f)(2). Additionally, NMFS must ensure that the activity does not take more than “small numbers” of marine mammal species and stocks – another standard that the agency improperly fails to evaluate in this draft EIS.

⁶⁸ DEIS at 1-4.

⁶⁹ DEIS at 2-45.

⁷⁰ See also 40 C.F.R. § 1500.2(e) (stating that agencies should identify and assess alternatives that would “avoid or minimize adverse effects of [proposed] actions upon the quality of the human environment”).

⁷¹ DEIS at 2-44.

⁷² *Id.*

applications that would cause “serious harm” or “undue harm.”⁷³ It is reasonable here for BOEM to define areas whose exploration would exceed these legal thresholds regardless of time of year, just as it defines areas for seasonal avoidance pursuant to other OCSLA and MMPA standards.⁷⁴ Regardless, the lease sale stage is not a proper vehicle for considering permanent exclusions for strictly off-lease activities, such as off-lease seismic surveys. At the very least, the draft EIS should consider establishing permanent exclusion areas, or deferring activity within certain areas, outside the boundaries of existing lease areas.

- (3) Eliminating duplicative surveys.— NMFS’s Open Water Panel has twice called for the elimination of unnecessary, duplicative surveys, whether through data sharing or some other means.⁷⁵ Yet the draft EIS pleads that BOEM cannot adopt this measure, on the grounds that the agency cannot “require companies to share proprietary data, combine seismic programs, change lease terms, or prevent companies from acquiring data in the same geographic area.”⁷⁶

This analysis overlooks BOEM’s statutory duty under OCSLA to approve only those permits whose exploration activities are not “unduly harmful” to marine life.⁷⁷ While OCSLA does not define the standard, it is difficult to imagine an activity more expressive of “undue harm” than a duplicative survey, which obtains data that the government and industry already possess and therefore is not necessary to the “expeditious and orderly development, subject to environmental safeguards” of the outer continental shelf.⁷⁸ It is thus within BOEM’s authority to decline to approve individual permit applications in whole or part that it finds are unnecessarily duplicative of existing or proposed surveys or data. Additionally, nothing in OCSLA bars BOEM from incentivizing the use of common surveyors or data sharing, as already occurs in the Gulf of Mexico, to reduce the total survey effort. The draft EIS also fails to consider this latter alternative.

B. Failure to fully develop conservation alternatives

NMFS must evaluate action alternatives that are more protective of Arctic resources. As found by the draft EIS, none of the action alternatives demonstrably reduces the environmental

⁷³ *E.g.*, 43 U.S.C. § 1340(a); 30 C.F.R. § 550.202.

⁷⁴ Similarly, NMFS should define such areas in light of the negligible impact and subsistence hunting standards in the MMPA. 16 U.S.C. §§ 1371(a)(5)(A), (D).

⁷⁵ Burns, J., Clark, C., Ferguson, M., Moore, S., Ragen, T., Southall, B., and Suydam, R., Expert panel review of monitoring and mitigation protocols in applications for incidental harassment authorizations related to oil and gas exploration, including seismic surveys, in the Chukchi and Beaufort Seas at 10 (2010) (Expert Panel Review 2010); Brower, H., Clark, C.W., Ferguson, M., Gedamke, J., Southall, B., and Suydam, R., 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 9 (2011) (Expert Panel Review 2011).

⁷⁶ DEIS at 2-46.

⁷⁷ 43 U.S.C. § 1340(a); *see also* 30 C.F.R. § 550.202.

⁷⁸ 30 U.S.C. § 1332(3).

impact of oil and gas exploration.⁷⁹ NEPA requires that agencies explore alternatives that “will avoid or minimize adverse effects of these actions upon the quality of the human environment.”⁸⁰ The analysis in the draft EIS both avoids proposing a beneficial alternative and consistently dilutes the advantages of mitigation measures that could be used as part of such an alternative.⁸¹

1. *Measures to reduce effects on Arctic resources*

Multiple alternatives with indistinguishable outcomes do not represent a “range” of alternatives and do not assist in determining preferential options. NMFS could, for example, include an alternative that requires all “standard” and “additional” mitigation measures, while adding limits such as late-season drilling prohibitions to protect migrating bowhead whales and reduce the harm from an oil spill. Reducing the harm from spills includes both increasing the chance that a spill can be stopped before the winter freeze up and potentially lessening the chance that large volumes of spilled oil remain in the ice and re-emerge during the spring.

Additionally, the draft EIS fails entirely to consider a number of other reasonable measures that would significantly reduce environmental risk from project activities.⁸² These include, but are not limited to:

- (1) A requirement that seismic survey vessels use the lowest practicable source levels, minimize horizontal propagation of the sound signal, and/or minimize the density of track lines consistent with the purposes of the survey. Accordingly, the agencies should consider establishing a review panel, potentially overseen by both NMFS and BOEM, to review survey designs with the aim of reducing their wildlife impacts;⁸³
- (2) A requirement that all vessels undergo measurement for their underwater noise output per American National Standards Institute/Acoustical Society of America standards (S12.64); that all vessels undergo regular maintenance to minimize propeller cavitation, which is the primary contributor to underwater ship noise; and/or that all new vessels be required to employ the best ship-quieting designs and technologies available for their class of ship;⁸⁴

⁷⁹ As explained *infra*, we do not believe that NMFS has adequately considered the benefits from measures such as facilitating emerging technology or imposing time and place restrictions.

⁸⁰ 40 C.F.R. § 1500.2(e).

⁸¹ Regardless, the proposals here constitute a reasonable alternative that must be considered by NMFS in any final EIS.

⁸² *Id.* § 1502.14 (alternatives should be compared to “sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decisionmaker and the public”)

⁸³ An independent panel may also be appropriate. For example, an independent peer review panel has been established to evaluate survey design of the Central Coastal California Seismic Imaging Project, which is aimed at studying fault systems near the Diablo Canyon nuclear power plant. See California Public Utilities Commission, Application of Pacific Gas and Electric Company for Approval of Ratepayer Funding to Perform Additional Seismic Studies Recommended by the California Energy Commission: Decision Granting the Application, *available at* docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/122059-09.htm.

⁸⁴ Renilson, M., Reducing underwater noise pollution from large commercial vessels (2009) *available at* www.ifaw.org/oceannoise/reports; Southall, B.L., and Scholik-Schlomer, A. eds. Final Report of the National Oceanic and Atmospheric Administration (NOAA) International Symposium: Potential Application of Vessel-

- (3) A speed limit (e.g., 10 knots) placed on all vessels transiting to and from a work site, with consideration for additional limits on vessel speed when transiting through important habitat areas, in order to reduce both underwater noise and ship-strike risk;⁸⁵
- (4) Required use of real-time passive acoustic monitoring in migratory corridors and other sensitive areas to alert ships to the presence of whales, primarily to reduce ship-strike risk;⁸⁶
- (5) A prohibition on all seismic surveys outside proposed lease sale areas, which, for reasons similar to those discussed above at section IV(C), are not essential to the stated purpose and need;
- (6) Use of additional best practices for monitoring and maintaining safety zones around active airgun arrays and other high-intensity underwater noise sources, as set forth in Weir and Dolman (2007) and Parsons et al. (2009); and⁸⁷
- (7) A deferral on exploration drilling until the concerns detailed by the U.S. Oil Spill Commission are adequately addressed.⁸⁸

2. *Faulty analysis of acoustic mitigation measures*

As part of developing additional alternatives that incorporate existing mitigation measures, NMFS must also substantially improve its assessment of those measures. The existing

Quieting Technology on Large Commercial Vessels, 1-2 May 2007, at Silver Springs, Maryland (2008) available at http://www.nmfs.noaa.gov/pr/pdfs/acoustics/vessel_symposium_report.pdf.

⁸⁵ Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S., and Podesta, M., Collisions between ships and whales, *Marine Mammal Science* 17:35-75 (2001); Pace, R.M., and Silber, G.K., Simple analyses of ship and large whale collisions: Does speed kill? Biennial Conference on the Biology of Marine Mammals, December 2005, San Diego, CA. (2005) (abstract); Vanderlaan, A.S.M., and Taggart, C.T., Vessel collisions with whales: The probability of lethal injury based on vessel speed. *Marine Mammal Science* 23:144-156 (2007); Renilson, M., Reducing underwater noise pollution from large commercial vessels (2009) available at www.ifaw.org/oceannoise/reports; Southall, B.L., and Scholik-Schlomer, A. eds. Final Report of the National Oceanic and Atmospheric Administration (NOAA) International Symposium: Potential Application of Vessel-Quieting Technology on Large Commercial Vessels, 1-2 May 2007, at Silver Springs, Maryland (2008), available at http://www.nmfs.noaa.gov/pr/pdfs/acoustics/vessel_symposium_report.pdf; Thompson, M.A., Cabe, B., Pace III, R.M., Levenson, J., and Wiley, D., Vessel compliance and commitment with speed regulations in the US Cape Cod Bay and off Race Point Right Whale Seasonal Management Areas. Biennial Conference on the Biology of Marine Mammals, November-December 2011, Tampa, FL (2011) (abstract); National Marine Fisheries Service, NOAA. 2010 Large Whale Ship Strikes Relative to Vessel Speed. Prepared within NOAA Fisheries to support the Ship Strike Reduction Program (2010), available at http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/ss_speed.pdf.

⁸⁶ Abramson, L., Polefka, S., Hastings, S., and Bor, K., Reducing the Threat of Ship Strikes on Large Cetaceans in the Santa Barbara Channel Region and Channel Islands National Marine Sanctuary: Recommendations and Case Studies (2009) (Marine Sanctuaries Conservation Series ONMS-11-01); Silber, G.K., S. Bettridge, and D. Cottingham, "Report of a workshop to identify and assess technologies to reduce ship strikes of large whales." Providence, Rhode Island, July 8-10, 2008 (2009) (NOAA Technical Memorandum. NMFS-OPR-42).

⁸⁷ Weir, C.R., and Dolman, S.J., Comparative review of the regional marine mammal mitigation guidelines implemented during industrial seismic surveys, and guidance towards a worldwide standard, *Journal of International Wildlife Law and Policy* 10: 1-27 (2007); Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009).

⁸⁸ See National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling* (2011).

draft EIS makes numerous errors: mischaracterizing the effectiveness and practicability of particular measures; failing to analyze variations of measures that may be more effective than the ones proposed; and failing to standardize measures that are plainly effective. More specifically:

- (1) Application of standard mitigation.— While the draft EIS states that the mitigation measures encompassed by its “Standard” list are mandatory, it also includes language suggesting that they would be applied on a case-by-case basis.⁸⁹ NMFS should make clear that this mitigation is indeed mandatory.
- (2) Limiting activities in low-visibility conditions. — Although the draft EIS acknowledges that limiting activities in low-visibility conditions can reduce the risk of ship-strikes and near-field noise exposures, it does not include the measure on its standard mitigation list.⁹⁰ Its rationale against doing so is flawed. *First*, it suggests that the restriction could extend the duration of a survey and thus the potential for cumulative disturbance of wildlife; but this concern would not apply to activities in migratory corridors, since target species like bowheads are transient. *Second*, while it suggests that the requirement would be expensive to implement, it does not consider the need to reduce ship-strike risk in heavily-used migratory corridors in order to justify authorization of an activity under the IHA process.⁹¹ At the very least, this requirement should be standardized for all activities involving moving vessels that occur in bowhead whale migratory corridors during the latter parts of the open-water season (i.e., September-October); and for all transits of support vessels in all areas at all times.
- (3) Standard safety zones.— The draft EIS fails to consider a number of recent studies on temporary threshold shift in establishing its 180/190 dB safety zone standard.⁹² These studies include: (1) a controlled exposure experiment demonstrating that harbor porpoises are substantially more susceptible to temporary threshold shift than the two species, bottlenose dolphins and belugas, that have previously been tested;⁹³ (2) a modeling effort indicating that, when uncertainties and individual variation are accounted for, a significant number of whales could suffer temporary threshold shift beyond 1 km from a seismic source;⁹⁴ (3) studies suggesting that the relationship between temporary and permanent threshold shift may not be as predictable as previously believed;⁹⁵ and (4) the oft-cited Southall et al. (2007), which suggests use

⁸⁹ DEIS at 4-139, 232.

⁹⁰ *Id.* at 4-153.

⁹¹ As discussed in these comments, IHAs cannot issue to activities with the potential to cause serious injury or mortality.

⁹² See DEIS at 4-139 to 4-141.

⁹³ Lucke, K., Siebert, U., Lepper, P.A., and Blanchet, M.-A., Temporary shift in masked hearing thresholds in a harbor porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli, *Journal of the Acoustical Society of America* 125: 4060-4070 (2009).

⁹⁴ Gedamke, J., Gales, N., and Frydman, S., Assessing risk of baleen whale hearing loss from seismic surveys: The effect of uncertainty and individual variation, *Journal of the Acoustical Society of America* 129:496-506 (2011).

⁹⁵ Kastak, D., Mulsow, J., Ghoul, A., Reichmuth, C., Noise-induced permanent threshold shift in a harbor seal [abstract], *Journal of the Acoustical Society of America* 123: 2986 (2008) (sudden, non-linear induction of permanent threshold shift in harbor seal during TTS experiment); Kujawa, S.G., and Liberman, M.C., Adding insult

of a cumulative exposure metric for temporary threshold shift in addition to the present RMS metric, given the potential occurrence of multiple surveys within reasonably close proximity.⁹⁶ NMFS should conservatively recalculate its safety zone distances in light of these studies, which indicate the need for larger safety zones, especially for the harbor porpoise.⁹⁷

- (4) Larger safety zones for aggregations of target species.— The draft EIS improperly rejects the 120 dB safety zone for bowhead whales, and the 160 dB safety zone for bowhead and gray whales that have been used in IHAs over the past five seasons.⁹⁸ First, although it claims that the measure is ineffective because it has never yet been triggered,⁹⁹ it does not consider whether a less stringent, more easily triggered threshold might be more appropriate given the existing data. For example, the draft EIS fails to consider whether requiring observers to identify at least 12 whales within the 160 dB safety zone, and then to determine that the animals are engaged in a “non-migratory, biologically significant behavior,” might not constitute too high a bar, and whether a different standard would provide a greater conservation benefit while enabling survey activity.

Second, the draft EIS disparages the measure by citing industry’s “serious concerns regarding the overall safety of conducting fixed-wing aircraft monitoring flights in the Arctic, especially in the Chukchi Sea.”¹⁰⁰ 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 confirmation of ice conditions during its planned drilling.¹⁰¹ In fact, Shell is planning to implement an aerial monitoring program extending 37 kilometers from the shore, as it has for a number of years when conducting offshore exploration activities.¹⁰² As NMFS’s Open Water Panel has recommended, unmanned flights should also be investigated.¹⁰³

Although time/area closures are a more effective means of reducing cumulative exposures of wildlife to disruptive and harmful sound, these expanded safety zones have value in minimizing disruptions, and potentially in reducing the risk of hearing loss and injury, outside the seasonal closure areas, particularly when cow-calf pairs

to injury: Cochlear nerve degeneration after “temporary” noise-induced hearing loss, *Journal of Neuroscience* 29: 14077-14085 (2009) (mechanism linking temporary to permanent threshold shift).

⁹⁶ See DEIS at 4-469; Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R., Jr., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack, P.L., Marine mammal noise exposure criteria: initial scientific recommendations, *Aquatic Mammals* 33:411-521 (2007) (Southall et al. (2007)).

⁹⁷ Similarly, NMFS must revise its risk analysis to account for lower thresholds of hearing loss. The new data on harbor porpoises should be added to the available data on bottlenose dolphins and belugas to determine thresholds for data-poor species.

⁹⁸ DEIS at 4-155 to 4-156.

⁹⁹ *Id.* at 4-155.

¹⁰⁰ *Id.* at 4-156.

¹⁰¹ 76 Fed. Reg. 69,958, 69,960 (Nov. 9, 2011).

¹⁰² *Id.* at 69,987.

¹⁰³ See Expert Panel Review 2011.

are present.¹⁰⁴ Indeed, NMFS should consider designing larger exclusion zones (detection-dependent or -independent) around river mouths with anadromous fish runs to protect beluga whale foraging habitat, insofar as these areas are not encompassed by seasonal closures.¹⁰⁵ Finally, independent of its consideration of expanded safety zones, NMFS should consider requiring aerial monitoring and/or fixed hydrophone arrays to reduce the risk of near-source injury and monitor for impacts.¹⁰⁶

- (5) Additional detection-based mitigation.— The draft EIS includes a number of detection-based measures on its “Additional Mitigation” list that should be standardized. For example, sound source verification has been required of Arctic operators for several years, as part of their IHA compliance requirements, and has proven useful for establishing more accurate, *in situ* measurements of safety zones and for acquiring information on noise propagation.¹⁰⁷ And passive acoustic monitoring systems – while being only partially effective, like all existing monitoring techniques – has had limited success in detecting toothed whale calls in the Arctic and elsewhere, as NMFS and its expert Open Water Panel have recognized.¹⁰⁸ Both measures should be included on the “Standard Mitigation” list.

- (6) Vessel avoidance of important habitat.— The draft EIS admits that routing ships around important habitat would benefit bowheads, belugas, gray whales, and walrus.¹⁰⁹ Indeed, it is well established that vessel routing can significantly reduce both cumulative noise exposure and the risk of ship-strikes.¹¹⁰ NMFS does not provide any justification for not including this measure on its “Standard Mitigation” list, except to note that “designated transit routes may be difficult to establish” in some areas.¹¹¹ But this observation, even if true, does not diminish the efficacy of avoiding known areas of biological importance, as NMFS notes is already the case for the Ledyard Bay Critical Habitat Unit in the Chukchi Sea.¹¹² Accordingly, the draft EIS should require avoidance of such areas as a standard mitigation measure.

¹⁰⁴ See 2006 PEA at 110-111 (noting sensitivity of baleen whale cow-calf pairs).

¹⁰⁵ See Miller, G.W., Moulton, V.D., Davis, R.A., Holst, M., Millman, P., MacGillivray, A., and Hannay, D., Monitoring seismic effects on marine mammals—southeastern Beaufort Sea, 2001-2002, in Armsworthy, S.L., et al. (eds.), *Offshore oil and gas environmental effects monitoring/Approaches and technologies*, at 511-542 (2005).

¹⁰⁶ *Id.*; Hatch, L., Clark, C., Merrick, R., Van Parijs, S., Ponirakis, D., Schwehr, K., Thompson, M., and Wiley, D., Characterizing the relative contributions of large vessels to total ocean noise fields: a case study using the Gerry E. Studds Stellwagen Bank National Marine Sanctuary, *Environmental Management* 42:735-752 (2008).

¹⁰⁷ See, e.g., Expert Panel Review 2010; Expert Panel Review 2011.

¹⁰⁸ *Id.*; see also Expert Panel Review 2010; DEIS at 4-153 to 4-155. See also Gillespie, D., Gordon, J., Mchugh, R., McLaren, D., Mellinger, D.K., Redmond, P., Thode, A., Trinder, P., and Deng, X.Y., PAMGUARD: semiautomated, open source software for real-time acoustic detection and localization of cetaceans, *Proceedings of the Institute of Acoustics* 30(5) (2008).

¹⁰⁹ DEIS at 4-160 to 4-161.

¹¹⁰ E.g., Hatch, L., Clark, C., Merrick, R., Van Parijs, S., Ponirakis, D., Schwehr, K., Thompson, M., and Wiley, D., Characterizing the relative contributions of large vessels to total ocean noise fields: a case study using the Gerry E. Studds Stellwagen Bank National Marine Sanctuary, *Environmental Management* 42:735-752 (2008).

¹¹¹ DEIS at 4-160 to 4-161.

¹¹² *Id.* at 4-161.

- (7) Required separation distances between survey vessels.— The draft EIS implies that requiring airgun surveys to maintain a 90-mile separation distance would reduce impacts in some circumstances but not in others, depending on the “area of operation, season, and whether whales are feeding or migrating.”¹¹³ NMFS does not provide any biological basis for this finding; indeed, it acknowledges that the “overlap” among sound fields would diminish if surveys are separated, reducing the risks of adverse synergistic effects.¹¹⁴ Rather, it observes that separating surveys could increase “the overall area of ensonification.”¹¹⁵ This analysis fails to consider, however, that the measure would affect only the timing, not the spatial extent of the survey effort: the overall area of ensonification would remain the same over the course of a season since survey activities would only be separated, not curtailed. Moreover, even if NMFS believes that surveys should not be separated in all cases, it should consider a measure that defines the conditions in which greater separation would be required.
- (8) Restrictions on numbers of activities to reduce survey duplication.— While acknowledging the conservation benefits of this measure, the draft EIS argues that the agencies have no legal authority to impose it.¹¹⁶ This position is based on an incorrect reading of OCSLA, as noted in these comments.

C. Failure to develop a viable technology alternative

The draft EIS, despite including seismic exploration technology as an alternative, has failed to consider any management action associated with that alternative.¹¹⁷ Instead, it merely supposes that industry may decide to use an exploration technology other than airguns, in place of one or more authorized surveys¹¹⁸ and then assesses the potential reduction in impact area.¹¹⁹ Such an approach does not constitute an action alternative for purposes of NEPA analysis and does not meet the important goal of advancing new technologies.

New technology represents a promising means of reducing the environmental footprint of seismic exploration. Industry experts and biologists participating in a September 2009 workshop on airgun alternatives reached the following conclusions: that airguns produce a great deal of “waste” sound and generate peak levels substantially higher than needed for offshore exploration; that a number of quieter technologies are either available now for commercial use or can be made available within the next five years; and that, given the natural resistance of industry, governments should accelerate development and use of these technologies through both

¹¹³ *Id.* at 4-159.

¹¹⁴ *Id.* See also Wright, A.J. ed., Report on the workshop on assessing the cumulative impacts of underwater noise with other anthropogenic stressors on marine mammals: from ideas to action, proceedings of workshop held by Okeanos Foundation, Monterey, California, August 26-29, 2009 (2009); BOEM, Site-specific environmental assessment of geological and geophysical survey application no. L11-007 for TGS-NOPEC Geophysical Company, at 22 (2011) (imposing separation distance in Gulf of Mexico, noting that purpose is to “allow for a corridor for marine mammal movement”).

¹¹⁵ DEIS at 4-159.

¹¹⁶ *Id.* at 4-158 to 4-159.

¹¹⁷ *Id.* at 4-38.

¹¹⁸ *Id.*

¹¹⁹ *Id.* at 4-319 to 4-320.

research and development funding and regulatory engagement.¹²⁰ Among the technologies discussed in the 2009 workshop report are engineering modifications to airguns, which can cut emissions at frequencies not needed for exploration; controlled sources, such as marine vibroseis, which can dramatically lower the peak sound currently generated by airguns by spreading it over time; various non-acoustic sources, such as electromagnetic and passive seismic devices, which in certain contexts can eliminate the need for sound entirely; and fiber-optic receivers, which can reduce the need for intense sound at the source by improving acquisition at the receiver.¹²¹ An industry-sponsored report by Noise Control Engineering made similar findings about the availability of greener alternatives to seismic airguns, as well as alternatives to a variety of other noise sources used in oil and gas exploration.¹²²

The draft EIS instead relies on out-of-date information in characterizing the availability of certain technologies. For example, marine vibroseis – which has the potential to reduce peak sound levels by 30 decibels or more and virtually eliminate output above 100 Hz – is on the verge of commercial availability, with useable arrays produced by Geo-Kinetics and PGS now being tested for their environmental impacts on fish, and other models in development through the Canadian government and a Joint Industry Program.¹²³ Yet the draft EIS uses a 2010 personal communication with PGS for the proposition that a commercial electric vibroseis array is not “available for data collection at this time”¹²⁴ – an outdated observation that does not reflect current fact.¹²⁵

Critically, the draft EIS fails to include any actionable alternatives to require, incentivize, or test the use of new technologies in the Arctic. Such alternatives include: (1) mandating the use of marine vibroseis or other technologies in pilot areas, with an obligation to accrue data on environmental impacts; (2) creating an adaptive process by which marine vibroseis or other technologies can be required as they become available; (3) deferring the permitting of surveys in particular areas or for particular applications where effective mitigative technologies, such as marine vibroseis, could reasonably be expected to become available within the life of the EIS; (4) providing incentives for use of these technologies as was done for passive acoustic monitoring systems in NTL 2007-G02; and (5) exacting funds from applicants to support accelerated mitigation research in this area. The final EIS must consider these alternatives.

¹²⁰ Weilgart, L. ed., Report of the workshop on alternative technologies to seismic airgun surveys for oil and gas exploration and their potential for reducing impacts on marine mammals, 31 Aug. – 1 Sept., 2009, Monterey, Calif. (2010), available at www.oceanos-stiftung.org/oceanos/download.php?id=19.

¹²¹ *Id.*

¹²² Spence, J., Fischer, R., Bahtiaran, M., Boroditsky, L., Jones, N., and Dempsey, R., Review of existing and future potential treatments for reducing underwater sound from oil and gas industry activities (2007) (NCE Report 07-001) (prepared by Noise Control Engineering for Joint Industry Programme on E&P Sound and Marine Life). Despite the promise indicated in the 2007 and 2010 reports, neither NMFS nor BOEM has attempted to develop noise-reduction technology for seismic or any other noise source, aside from BOEM’s failed investigation of mobile bubble curtains.

¹²³ Tengeham, R., An electrical marine vibrator with a flextensional shell, *Exploration Geophysics* 37:286-291 (2006); LGL and Marine Acoustics, Environmental assessment of marine vibroseis (2011) (Joint Industry Programme contract 22 07-12).

¹²⁴ DEIS at 2-26.

¹²⁵ Nor does the draft EIS explain why obtaining data quality or environmental information on these technologies would have been exorbitant.

D. Faulty analysis of time/place restrictions

Time and place restrictions designed to protect high-value habitat are one of the most effective means to reduce the potential impacts of noise and disturbance, including noise from oil and gas exploration.¹²⁶ The draft EIS recognizes that, in general, if marine mammals are displaced from important feeding or breeding areas impacts could be “noteworthy.”¹²⁷ When assessing the potential benefits of time and place restrictions in Alternative 4 designed to protect such habitat, however, the draft EIS concludes that all of the marine mammal impact descriptors remain unchanged. Those findings are based largely on the belief that activity levels may not be reduced by the time/place restrictions and that the resulting permissible disturbances would lead to effects that are roughly equivalent to exploration without the restrictions in place. Neither justification holds up to scrutiny. In addition, any final EIS must consider including additional areas and developing a mechanism for new areas to be added over the life of the EIS.

1. *Benefits of protecting important habitat*

The draft EIS repeatedly asserts, without support, that time and place limitations may not result in fewer exploration activities.¹²⁸ The draft EIS must do more to justify its position.¹²⁹ It cannot simply assume that desirable locations for exploration activities are fungible enough that a restriction on activities in Camden Bay, for example, will lead to more exploration between Camden Bay and Harrison Bay.¹³⁰ Indeed, the draft EIS at times recognizes that “lower levels of exploration activities may actually occur[,]” leading to a “smaller increase” in the number of activities as compared to the other action alternatives.¹³¹ When examining the socioeconomic impact of Alternative 4, the draft EIS states that time/area closures “may result in” reduced personal income for locals due to “reductions in the durations of these positions.”¹³²

More importantly, in its analysis the draft EIS seemingly disregards the entire rationale for establishing the closures: they provide important protections for species and subsistence hunting based on particular habitat use. Or, as phrased in the draft EIS, the closures are intended “to reduce adverse impacts to marine mammals in areas (and times) important to biological productivity and life history functions and to minimize conflicts with Alaska Native marine

¹²⁶ See, e.g., Letter from Dr. Jane Lubchenco, Undersecretary of Commerce for Oceans and Atmosphere, to Nancy Sutley, Chair, Council on Environmental Quality at 2 (Jan. 19, 2010); Agardy, T., et al., A Global Scientific Workshop on Spatio-Temporal Management of Noise (October 2007).

¹²⁷ DEIS at 4-89.

¹²⁸ In its conclusion for bowhead whales, for example, the draft EIS states that “exploration effort may not be reduced, but rather redistributed and possibly concentrated in other areas.” *Id.* at 4-296; see also *id.* at 4-289 (“under this alternative, there would be no reduction in the overall amount of activity occurring”); 4-307 (stating that “any reduction in impacts in one location and time could be displaced to another location and time and the total number of animals affected by exploration activities may not change with the implementation of this mitigation measure”).

¹²⁹ *Coal. for Canyon Pres. v. Bowers*, 632 F.2d 774, 782 n. 3 (9th Cir. 1980) (“But nothing more was said except that such pollution would ‘occur anyhow’ because traffic was bound to increase regardless of whether or not the project was built. Nothing referred to any studies or to facts on which these conclusions were based.”)

¹³⁰ See DEIS at 4-296; 4-303.

¹³¹ *Id.* at 4-283 (examining effects on acoustic habitat). See also *id.* at 308-309 (closures, such those Ledyard Bay, “could be so extensive that overall exploration activity could be reduced”); *id.* at 313 (limits could “potentially impede” exploration activity).

¹³² *Id.* at 4-547.

mammal subsistence hunting activities.”¹³³ This can reduce the severity of impacts related to missed feeding opportunities when marine mammals lose “their energy input at that site and necessitating the use of additional reserves to find food at an alternate spot[.]”¹³⁴

The draft EIS acknowledges the obvious point that the effects of oil and gas exploration will depend on the number of activities taking place in a particular area.¹³⁵ As NMFS found in its 2008 regional biological opinion for the Arctic, whether noise disturbances from oil and gas activities potentially result in a “biologically significant” impact on bowhead whales depends on the “timing, location, and number” of the disturbances.¹³⁶ Bowhead whales are known to feed around Camden Bay and a “disproportionately higher number of mothers and calves occur in Camden Bay from early September into October.”¹³⁷ Bowhead whales are also known to routinely congregate and feed around Barrow Canyon.¹³⁸ If large numbers of bowhead whale cows and calves avoid feeding or resting areas over a period of many weeks it “could result in effects that are biologically significant.”¹³⁹ The same considerations are true for other species, such as beluga whales and walrus.¹⁴⁰

Nevertheless, according to the draft EIS offsets the benefits of the time/area closures by maintaining that marine mammals may still be affected by those activities that are permitted to go forward at other times or in other places. Concurrent closures “could result in excluded activities concentrating in areas not included in the closure areas[.]”¹⁴¹ Although protecting Barrow Canyon and Camden Bay, for example, “could mitigate adverse impacts” the “overall” impact would be the similar to Alternative 3.¹⁴² According to the draft EIS, when migration corridors are considered, bowhead whales use a considerable portion of the EIS project area outside of the protected areas, implying that all bowhead habitat in the Arctic is of equal importance.¹⁴³ For belugas, because the draft EIS assumes that the activity levels would remain

¹³³ *Id.* at 4-293.

¹³⁴ *Id.* at 4-157.

¹³⁵ *See id.* at 4-255 (“The extent of the impact would depend on the number of seismic activities and associated support vessels in an area.”); *see also id.* (“The extent of impact resulting from the addition of a second drilling program in each sea would depend on the spatial and temporal distribution of the activities within the open water season.”).

¹³⁶ 2008 BiOp at 86 (activities “could produce sufficient noise and disturbance that whales might avoid an area of high value to them and suffer consequences of biological significance”).

¹³⁷ DEIS at 4-294.

¹³⁸ *Id.* at 4-295.

¹³⁹ *Id.* at 4-121. The draft EIS also notes that disruption of feeding cows and calves during the late summer and fall “when bowheads are building fat and energy reserves prior to migrating” could result in effects with “potential biological significance.” *Id.* at 4-156. NMFS, however, not always limited its caution to those activities that could affect cows and calves. In its 2008 regional biological opinion for exploration activities, NMFS found that consequences would be “of particular concern” if inaccessible areas included locations used for feeding or resting “by large numbers of individuals” or by females and calves. 2008 BiOp at 86.

¹⁴⁰ DEIS at 4-114. The draft EIS notes that the importance of walrus displacement “would depend on the quality of the benthic habitat for feeding walrus and its proximity to the ice pack or haulouts on land.” *Id.* at 4-132.

¹⁴¹ *Id.* at 4-296.

¹⁴² *Id.*

¹⁴³ *Id.* The draft EIS also warns of higher exposures of marine mammals due to operations occurring in close vicinity to one another due to a compressed exploration schedule. *Id.* at 4-283. And yet the draft EIS elsewhere expresses confidence in the existing minimum separation distance between seismic vessels to mitigate effects. *Id.* at 4-257 (mandatory separation “would effectively limit the intensity of effects on beluga whale regardless of where the activities take place”).

the same, the overall effects “would therefore be similar to what would occur under Alternative 3[.]” although disturbances may occur in different times and places.¹⁴⁴ This cursory analysis does not adequately consider the potential benefits to marine mammals from area closures that are specifically designed to protect important habitat.¹⁴⁵ The draft EIS offers no justification for equating sound exposures within these sensitive locations during critical time periods with all other sound exposures occurring anywhere in the Arctic.

The draft EIS should also consider to what degree the time/place restrictions could protect marine mammals from some of the harmful effects from an oil spill. Avoiding exploration drilling during times when marine mammals may be concentrated nearby could help to ameliorate the more severe impacts discussed in the draft EIS.¹⁴⁶

2. *Additional areas for protections*

While the draft EIS provides a reasonable starting point for habitat protections there are additional areas – and expanded versions of the suggested areas – that must be considered.

In the Chukchi Sea, any final EIS should include the zone along the Alaskan coastline among the locations that should be considered for special restrictions, an area important enough to justify multiple requests from NMFS for leasing deferrals. Commenting on the original Lease Sale 193 draft EIS, NMFS “strongly endorse[d]” an alternative that would have avoided any federal leases out to 60 miles.¹⁴⁷ NMFS articulated a number of reasons in support of its position, including reducing impacts on endangered bowhead whales, avoiding harm to Native subsistence hunts, protecting the nearshore from “catastrophic” events, and reducing the effects of seismic surveying on the productive zone along the coast.¹⁴⁸ In its March 2009 comments on

¹⁴⁴ *Id.* at 4-299. *See also id.* at 4-303 (discussing results for other cetaceans); *id.* at 4-159 (protections “could appreciably” reduce potential effects on walrus at Hanna Shoal). *Cf.* MMS, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea, OCS EIS/EA MMS 2007-026 at IV-155 (May 2007) (LS 193 FEIS), *available at* http://www.alaska.boemre.gov/ref/EIS%20EA/Chukchi_FEIS_193/feis_193.htm (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”). The similarity of the alternatives’ impacts – at least as interpreted by NMFS – further emphasizes the need for the draft EIS to add an alternative that results in measurable improvements to the marine resources. *See text, supra.*

¹⁴⁵ The failure of the draft EIS to establish applicable buffers for the protected areas also confuses the analysis. Although the draft explains that buffer areas could be required, it does not establish any specifics as to their size. DEIS at 4-293. NMFS must fully define the parameters of its alternatives in order to allow for a coherent analysis of likely effects. Instead, the draft EIS repeatedly notes that activities taking place outside the protected areas could still affect marine mammals within but that buffer zones “would help to reduce further impacts from occurring within these special habitat areas.” *Id.* at 4-294; *see also* 4-295 (same); 4-295 (same); 4-296 (same); 4-301 (same); 4-302 (same). If agency properly defined buffer areas, this equivocation would be unnecessary.

¹⁴⁶ *Id.* at 4-422 (harm to bowhead whales during feeding); 4-388 (harm to seals were a spill to reach a polynya or lead system); 4-394 (harm to marine mammals from a winter spill near Hannah Shoal). *See also id.* at 4-355 (“A VLOS from a nearshore site would allow less time for oil to be weathered, dispersed, and/or recovered before reaching shore.”); 4-381 (noting that deferral corridors could offer protections to sensitive nearshore areas should a spill occur).

¹⁴⁷ NMFS LS 193 Cmts at 3.

¹⁴⁸ *Id.* In its 2008 Biological Opinion, NMFS determined that noise-producing activities, such as seismic surveys, in the spring lead system during the migration have “a fairly high potential of affecting the whales, including females with newborn calves” and stated that impacts could be “potentially biologically significant.” 2008 BiOp at 52.

the draft Arctic multi-sale EIS, NMFS repeated these same rationales and again “strongly endorse[d]” the 60-mile corridor alternative from lease sale 193.¹⁴⁹ Indeed, NMFS recommended a deferral of leasing both along the Chukchi Sea coast and around Hannah Shoal, indicating that moving forward was premature “until such time as it can be demonstrated that exploration and development activities in these sensitive regions can be accomplished without significant impacts to marine mammal populations or subsistence hunters.”¹⁵⁰ Most recently, NMFS reaffirmed its stance in comments on the draft supplemental EIS for lease sale 193, issued following a court-ordered remand.¹⁵¹

NMFS’s position that coastal protections will benefit bowhead whales is based on the proximity of the Chukchi Sea shoreline to the spring lead system, described by NMFS as “one of the most sensitive environments” for bowhead whales.¹⁵² During their spring migration, whales follow the narrow, newly opened pathways in the ice to reach the Canadian Beaufort Sea. Not only is unobstructed passage critical for the bowheads’ successful transit to their summer feeding grounds, but studies also indicate that “most calving occurs during the spring migration when whales are in the Chukchi Sea.”¹⁵³ The draft EIS recognizes that a “catastrophic discharge event contaminating ice leads or polynyas in the spring could have devastating effects, trapping bowhead whales where they may encounter fresh crude oil.”¹⁵⁴ Beluga whales also make use of the spring leads, leaving them equally vulnerable to nearshore spill.¹⁵⁵ Avoiding exploratory drilling proximate to the spring lead system and avoiding late season drilling would help to reduce the risk of oil contaminating the spring lead.¹⁵⁶ At a minimum, NMFS should consider timing restrictions in the Chukchi Sea to avoid activities taking place too early in the open water season.

In the Beaufort Sea, any protections for Camden Bay should extend beyond the dimensions of the Bay itself to include areas located to the west and east, recently identified by NMFS as having “special significance” to bowhead whales.¹⁵⁷ Bowhead Whale Aerial Survey Project (or BWASP) sightings show that whales are found feeding in many years on both sides of the Bay.¹⁵⁸ Industry surveys have also confirmed whales feeding west of Camden Bay in both 2007 and 2008.¹⁵⁹ NMFS determined that the greater Camden Bay area is one of three “key”

¹⁴⁹ NMFS Multi-Sale Cmts at 9-10.

¹⁵⁰ *Id.* at 10.

¹⁵¹ NMFS LS 193 2011 Cmts at 7.

¹⁵² NMFS Multi-Sale Cmts at 9.

¹⁵³ 2008 BiOp at 10.

¹⁵⁴ DEIS at 4-383.

¹⁵⁵ *Id.* at 4-384 – 4-385.

¹⁵⁶ *See* LS 193 FSEIS at IV-268 (noting that spills originating farther from the spring lead system “allow[] more time to respond”); *id.* at IV-273; DEIS at 4-355 (same).

¹⁵⁷ 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 24 (July 13, 2010) (2010 BiOp).

¹⁵⁸ *Id.* at 24, 67 (Brownlow Point); *see also* Ferguson et al., A Tale of Two Seas: Lessons from Multi-decadal Aerial Surveys for Cetaceans in the Beaufort and Chukchi Seas (2011 PowerPoint) (slide 15), attached as Exh. 1. A larger version of the map from the PowerPoint is attached as Exh. 2.

¹⁵⁹ Shell, Revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Beaufort Sea, Alaska, , Appendix F 3-79 (May 2011) (Beaufort EIA), *available at* <http://boem.gov/Oil-and-Gas-Energy-Program/Plans/Regional-Plans/Alaska-Exploration-Plans/2012-Shell-Beaufort-EP/Index.aspx>.

feeding sites, along with Point Barrow and the eastern Beaufort Sea.¹⁶⁰ The area eastward near Kaktovik, in addition to supporting bowhead feeding, is used for subsistence hunting. BWASP data also demonstrate that bowhead whale feeding aggregations are more likely to be encountered in places such as north of Dease Inlet to Smith Bay; northeast of Smith Bay; and northeast of Cape Halkett.¹⁶¹ More broadly, NMFS should consider timing restrictions to avoid the peak of the bowhead migration throughout the Beaufort Sea.

Additional habitat may come to light both as this NEPA process moves forward and after the final EIS is issued. NMFS's habitat mapping workshop is scheduled to release information this year, and the Chukchi Sea Acoustics, Oceanography, and Zooplankton study is well underway. These and other studies emphasize the evolving nature of information available concerning the Arctic. As part of the EIS, NMFS should establish a plan for continuing to gather information. As these and other future studies identify new areas that merit special management, the EIS should have a clearly defined process that would allow for their addition.¹⁶²

E. Faulty analysis of no action alternative

The draft EIS cannot assume that any delay in exploration activity compromises property rights or immediately triggers compensation from the government.¹⁶³ Offshore leases do not convey a fee simple interest with a guarantee that exploration activities will take place. As the Supreme Court recognized, OCSLA's plain language indicates that "the purchase of a lease entails no right to proceed with full exploration, development, or production"¹⁶⁴ Activities on leases are also subject to a variety of laws designed to protect the environment¹⁶⁵ and the "strictures placed in these statutes for the environment's protection will condition the lessees' rights" as well as the obligations of the government.¹⁶⁶ Leases typically include express language noting that, in addition to OCSLA, they are subject to all other applicable statutes and regulations.¹⁶⁷

The draft EIS draws a distinction between the "inability of BOEM and NMFS to issue permits and authorizations" as a result of the no action alternative and "the denial of a permit/authorization based on regulatory review[.]"¹⁶⁸ This perspective proceeds from the

¹⁶⁰ 2010 BiOp at 25.

¹⁶¹ See 2008 BiOp at 65.

¹⁶² Similar points are included in a September 20, 2011, letter to NMFS from conservation groups. See Alaska Wilderness League, *et al.*, Letter to Jane Lubchenco, Ph.D. Re. Environmental Impact for Oil and Gas Exploration in the Arctic (Sept. 20, 2011), attached as Exh. 3.

¹⁶³ DEIS at 4-13; 4-16.

¹⁶⁴ *Sec'y of the Interior v. California*, 464 U.S. 312, 339 (1984).

¹⁶⁵ *North Slope Borough v. Andrus*, 642 F.2d 589, 594 (D.C. Cir. 1980) (stating that OCSLA, the ESA, and the MMPA all authorize the government to review activities taking place pursuant to offshore leases and "to suspend any such activity which jeopardizes the environment"); see also *id.* at 595 (noting that the MMPA requires the government to "prevent harm to protected wildlife")

¹⁶⁶ *North Slope*, 642 F.2d at 594.

¹⁶⁷ BOEM, Oil and Gas Lease of Submerged Lands Under the Outer Continental Shelf Lands Act, Form MMS-2005, Sec. 1, Statutes and Regulations (Oct. 2011), available at <http://www.gomr.boemre.gov/homepg/forms/BOEM-2005.pdf>. See also NMFS Multi-Sale Cmts at 11 (warning that MMPA take authorization "may not be possible in biologically sensitive regions or in areas important for subsistence hunting of marine mammals).

¹⁶⁸ DEIS at 4-16.

mistaken notion that the choice of the no action alternative is divorced from any substantive law. It is well-established that NEPA “does not work a broadening of the agency’s substantive powers.”¹⁶⁹ Whatever action the agencies ultimately choose to take must be “within [their] province in the first instance.”¹⁷⁰ Consequently, a no action alternative that is justified by the governing statutes – as it indeed is here– would not “run contrary” to federal management of the outer continental shelf; rather it would uphold the protections that are an indisputable part of that management.¹⁷¹

IV. FAILURE TO ADEQUATELY ANALYZE THE EFFECTS OF NOISE

A. No quantitative examination of harassment

The draft EIS does not attempt to estimate the number of marine mammal takes under each proposed alternative, choosing instead to evaluate disturbance according to a set of biologically arbitrary and legally dubious “impact criteria.” We find this approach nothing short of astonishing. It contradicts several years of agency practice – a practice beginning with NMFS’s adoption of the Navy’s AIM model for SURTASS LFA rulemaking in 2002, continuing through the several years of NEPA analyses and rulemakings for sonar training on the Navy’s many offshore ranges, and governing analyses of seismic surveys in the Arctic and, for the National Science Foundation’s research activities, in numerous locations around the world.¹⁷² No reason is offered for this deviation from established practice; and indeed, NMFS continues to require seismic and drilling applicants to provide take numbers to support its own findings under NEPA and MMPA.¹⁷³

Uncertainty about the locations of activities cannot plausibly justify NMFS’s failure in this case. The five-year, programmatic NEPA analyses that the agencies produced on the Navy’s offshore ranges each quantified take from multiple types of sonar training, over areas at least as expansive as those considered here, with a goal of affording the Navy considerable flexibility in planning and conducting operations. The AFAST EIS, for example, considered more than one dozen types of sonar training, and nearly as many sound sources, across the entire eastern seaboard and Gulf of Mexico – and still provided comparative take numbers for each of several major alternatives. In the case of SURTASS LFA, the agencies produced nominal take numbers for an activity that encompasses literally three-quarters of the world’s oceans. The National Science Foundation’s programmatic EIS for academic seismic surveys, which also provided take numbers, is almost equal in geographic scope; and NSF continues to apply for IHAs on a project-

¹⁶⁹ *Natural Res. Def. Council v. EPA*, 822 F.2d 104, 129 (D.C. Cir. 1987).

¹⁷⁰ *Id.*

¹⁷¹ DEIS at 4-15.

¹⁷² *See, e.g.*, U.S. Navy, Final Overseas Environmental Impact Statement and Environmental Impact Statement for Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar (2011); U.S. Navy, Final Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement (2008); National Science Foundation, Final Programmatic Environmental Impact Statement/ Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (2011).

¹⁷³ *See, e.g.*, 76 Fed. Reg. at 69,990 (proposed IHA for Shell drilling in Chukchi Sea); 76 Fed. Reg. 58,473 (Sept. 21, 2011) (proposed IHA for Apache seismic survey in Cook Inlet); 76 Fed. Reg. 46,729 (Aug. 3, 2011) (issued IHA for Statoil shallow hazards survey in the Chukchi Sea).

by-project basis, as would industry in the Beaufort and Chukchi seas. NMFS simply has no reasonable justification for failing to provide take numbers here.

In addition, the draft EIS fails to provide any quantification of masking effects, either from continuous noise sources such as icebreakers and ships or from mixed impulsive/continuous noise sources such as airguns. Researchers at NOAA and Cornell have created a model that quantifies impacts on the communication space of marine mammals. That published model has already been applied to shipping noise off Massachusetts and off British Columbia, and the same researchers involved in the Massachusetts study have applied it to airgun surveys as well.¹⁷⁴ Remarkably, the draft EIS – instead of applying the model – simply states without any discernible support that “masking of marine mammal calls and other natural sounds are expected to be limited”.¹⁷⁵ It also approvingly references an industry-academic project in the Beaufort Sea (mentioned *supra*) that might ultimately provide more information on masking effects¹⁷⁶ – ignoring the fact that this project will apply the same “communication space” model.¹⁷⁷ Assessing masking effects is essential to a reasoned consideration of impacts and alternatives, and NMFS’s failure to apply a relevant, published model that its own scientists helped develop violates NEPA.

B. Outdated marine mammal disturbance thresholds

First, the draft EIS uses a single sound pressure level (160 dB (RMS)) as a threshold for behavioral, sublethal take in all marine mammal species from seismic airguns. This approach does not reflect the best available science, and the choice of threshold is not sufficiently conservative in several important respects:

- (1) The method represents a step backward from recent programmatic authorizations. For Navy sonar activity, NMFS has used a combination of specific bright-line thresholds (for harbor porpoises) and linear risk functions that endeavor to take account of risk and individual variability and to reflect the potential for take at relatively low levels.¹⁷⁸ In the wake of these past authorizations for acoustic impacts on marine mammals, the agencies’ reversion to a single, non-conservative, bright-line threshold for all species is simply not tenable.
- (2) The 160 dB threshold is non-conservative, since the scientific literature establishes that behavioral disruption can occur at substantially lower received levels for some species.

¹⁷⁴ Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009); Williams, R., Ashe, E., Clark, C.W., Hammond, P.S., Lusseau, D., and Ponirakis, D., Inextricably linked: boats, noise, Chinook salmon and killer whale recovery in the northeast Pacific, presentation given at the Society for Marine Mammalogy Biennial Conference, Tampa, Florida, Nov. 29, 2011 (2011).

¹⁷⁵ DEIS at 4-88.

¹⁷⁶ *Id.*

¹⁷⁷ Fleishman, E., and Streever, B., Assessment of cumulative effects of anthropogenic underwater sound: project summary and status, at 2 (2012).

¹⁷⁸ *E.g.*, 74 Fed. Reg. 4844, 4844-4885 (Jan. 27, 2009).

It is well established that bowhead whales are behaviorally disrupted by noise at levels far below NMFS's threshold. Bowheads migrating through the Beaufort Sea have shown almost complete avoidance at received levels at 120-130 dB (RMS) and below.¹⁷⁹ For this reason BOEM has stated in past Arctic lease sale EISs, that most bowheads "would be expected to avoid an active source vessel at received levels as low as 116 to 135 dB re 1 μ Pa when migrating."¹⁸⁰ Similarly, in its past attempt at a programmatic EIS for Arctic oil and gas exploration, NMFS imposed a 120-dB safety zone for aggregations of bowhead whales based on its finding that "bowhead whales apparently show some avoidance in areas of seismic sounds at levels lower than 120 dB."¹⁸¹ Even the present draft EIS admits that seismic causes behavioral impacts in bowhead whales at received levels of 120 dB or below.¹⁸² And although bowheads appear less aversive while feeding, the draft EIS rightly acknowledges that they may be "so highly motivated to remain in a productive feeding area" that they experience adverse effects and increased chronic stress.¹⁸³

Beluga whales are highly sensitive to a range of anthropogenic sounds, including broadband sounds whose energy is concentrated in the low frequencies. For example, belugas in the Canadian high Arctic were found to produce alarm calls at 85 km distance from a large ship and icebreaker, and to start engaging in avoidance behavior at 45-60 km, where received levels were 94-105 decibels; apparently the whales moved to areas up to 80 km from the vessels and did not return for 1-2 days following the transit.¹⁸⁴ In the presence of various types of ships, including cargo vessels, tug boats, and motor boats, belugas in other areas have been shown to break off foraging and other activities and to separate or swim away, even at relatively low received levels; in many cases, the effects were reported to last for some time after the source had departed.¹⁸⁵ As for seismic in particular, few migrating belugas were sighted

¹⁷⁹ Miller, G.W., Elliot, R.E., Koski, W.R., Moulton, V.D., and Richardson W.J., Whales, in Richardson, W.J. (ed.), *Marine Mammal and Acoustical Monitoring of Western Geophysical's Open-Water Seismic Program in the Alaskan Beaufort Sea*, 1998 (1999); Richardson, W.J., Miller, G.W., and Greene Jr., C.R., Displacement of migrating bowhead whales by sounds from seismic surveys in shallow waters of the Beaufort Sea, *Journal of the Acoustical Society of America* 106:2281 (1999).

¹⁸⁰ DEIS at 4-99; see also 2008 Multi-Sale DEIS.

¹⁸¹ See 2006 PEA; 71 Fed. Reg. 66,912, 66,913 (2006) (noting that "the 120-dB mitigation measure was essential to allow NMFS to conclude with a FONSI, especially given the level of uncertainty on the effects of seismic surveys on bowhead whales in Arctic waters").

¹⁸² DEIS at 4-99.

¹⁸³ *Id.*

¹⁸⁴ Findley, K.J., Miller, G.W., Davis, R.A., and Greene, C.R., Jr., Reactions of belugas, *Delphinapterus leucas*, and narwhals, *Monodon monoceros*, to ice-breaking ships in the Canadian high Arctic, *Can. J. Fish. Aquat. Sci.* 224: 97-117 (1990); see also Cosens, S.E., and Dueck, L.P., Ice breaker noise in Lancaster Sound, NWT, Canada: implications for marine mammal behavior, *Mar. Mamm. Sci.* 9: 285-300 (1993).

¹⁸⁵ See, e.g., Fraker, M.A., The 1976 white whale monitoring program, MacKenzie estuary, report for Imperial Oil, Ltd., Calgary (1977); Fraker, M.A., The 1977 white whale monitoring program, MacKenzie estuary, report for Imperial Oil, Ltd., Calgary (1977); Fraker, M.A., The 1978 white whale monitoring program, MacKenzie estuary, report for Imperial Oil, Ltd., Calgary (1978); Stewart, B.S., Evans, W.E., and Awbrey, F.T., Effects of man-made water-borne noise on the behaviour of beluga whales, *Delphinapterus leucas*, in Bristol Bay, Alaska, Hubbs Sea World (1982) (report 82-145 to NOAA); Stewart, B.S., Awbrey, F.T., and Evans, W.E., Belukha whale (*Delphinapterus leucas*) responses to industrial noise in Nushagak Bay, Alaska: 1983 (1983); Edds, P.L., and

within 10-20 km of seismic vessels during aerial surveys in the Beaufort Sea.¹⁸⁶ All of these impact distances significantly exceed those predicted by the draft EIS's 160 dB (RMS) threshold.

Data on other species, some of which occur in the Beaufort and Chukchi Seas, provide further evidence of impacts at significantly lower levels. For example, a single seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging – over an area at least 100,000 square nautical miles in size, and can cause baleen whales to abandon habitat over the same scale.¹⁸⁷ Sperm whale foraging success, as measured by buzz rate, appears to decline significantly on exposure to received levels above 130 dB (RMS), with potentially serious long-term consequences.¹⁸⁸ Harbor porpoises are known to be acutely sensitive to a range of anthropogenic sources, including airguns. They have been observed to engage in avoidance responses fifty miles from a seismic airgun array – a result that is consistent with both captive and wild animal studies showing them abandoning habitat in response to pulsed sounds at very low received levels, well below 120 decibels (re 1 μ Pa (RMS)).¹⁸⁹

The evidentiary record here substantially exceeds the one for mid-frequency sonar in *Ocean Mammal Institute v. Gates*, in which a Hawaiian District Court judge invalidated a NMFS threshold that ignored documented impacts at lower received levels as arbitrary and capricious.¹⁹⁰

- (3) The use of a multi-pulse standard for behavior harassment is non-conservative, since it does not take into account the spreading of seismic pulses over time beyond a certain distance from the array.¹⁹¹ NMFS's own Open Water Panel for the Arctic –

MacFarlane, J.A.F., Occurrence and general behavior of balaenopterid cetaceans summering in the St. Lawrence estuary, *Canada, Can. J. Zoo.* 65: 1363-1376 (1987).

¹⁸⁶ Miller, G.W., Moulton, V.D., Davis, R.A., Holst, M., Millman, P., MacGillivray, A., and Hannay, D., Monitoring seismic effects on marine mammals—southeastern Beaufort Sea, 2001-2002, in Armsworthy, S.L., et al. (eds.), *Offshore oil and gas environmental effects monitoring/Approaches and technologies*, at 511-542 (2005).

¹⁸⁷ Clark, C.W., and Gagnon, G.C., Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E9); Clark, C.W., pers. comm. with M. Jasny, NRDC (Apr. 2010); see also MacLeod, K., Simmonds, M.P., and Murray, E., Abundance of fin (*Balaenoptera physalus*) and sei whales (*B. borealis*) amid oil exploration and development off northwest Scotland, *Journal of Cetacean Research and Management* 8: 247-254 (2006).

¹⁸⁸ Miller, P.J.O., Johnson, M.P., Madsen, P.T., Biassoni, N., Quero, M., and Tyack, P.L., Using at-sea experiments to study the effects of airguns on the foraging behavior of sperm whales in the Gulf of Mexico, *Deep-Sea Research I* 56: 1168-1181 (2009).

¹⁸⁹ E.g., Bain, D.E., and Williams, R., Long-range effects of airgun noise on marine mammals: responses as a function of received sound level and distance (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E35); Kastelein, R.A., Verboom, W.C., Jennings, N., and de Haan, D., Behavioral avoidance threshold level of a harbor porpoise (*Phocoena phocoena*) for a continuous 50 kHz pure tone, *Journal of the Acoustical Society of America* 123: 1858-1861 (2008); Kastelein, R.A., Verboom, W.C., Muijsers, M., Jennings, N.V., and van der Heul, S., The influence of acoustic emissions for underwater data transmission on the behavior of harbour porpoises (*Phocoena phocoena*) in a floating pen, *Mar. Environ. Res.* 59: 287-307 (2005); Olesiuk, P.F., Nichol, L.M., Sowden, M.J., and Ford, J.K.B., Effect of the sound generated by an acoustic harassment device on the relative abundance and distribution of harbor porpoises (*Phocoena phocoena*) in Retreat Passage, British Columbia, *Mar. Mamm. Sci.* 18: 843-862 (2002).

¹⁹⁰ 546 F. Supp.2d 960, 973-75 (D. Hawaii 2008).

¹⁹¹ See Expert Panel Review 2011.

which has included some of the country's leading marine bioacousticians – has twice characterized the seismic airgun array as a mixed impulsive/continuous noise source and has stated that NMFS should evaluate its impacts on that basis.¹⁹² That analysis is supported by the masking effects model referenced above, in which several NMFS scientists have participated; by a Scripps study, showing that seismic exploration in the Arctic has raised ambient noise levels on the Chukchi Sea continental slope (*see infra*); and, we expect, by the modeling efforts of NOAA's Sound Mapping working group, whose work will be completed this April or May. NMFS cannot continue to ignore its own science.

- (4) The threshold's basis in RMS, rather than peak pressure, is non-conservative. Studies have criticized the use of RMS for seismic because of the degree to which pulsed sounds must be "stretched."¹⁹³

NMFS must revise the thresholds and methodology used to estimate take from airgun use. Specifically, we urge the following:

- (a) NMFS should employ a combination of specific thresholds for which sufficient species-specific data are available and generalized thresholds for all other species.¹⁹⁴ These thresholds should be expressed as linear risk functions where appropriate. If a risk function is used, the 50% take parameter for all the baleen whales (bowhead, fin, humpback, and gray whales) and odontocetes occurring in the area (beluga whales, narwhals, killer whales, harbor porpoises) should not exceed 140 dB (RMS). Indeed, at least for bowhead whales, beluga whales, and harbor porpoises, NMFS should use a threshold well below that number, reflecting the high levels of disturbance seen in these species at 120 dB (RMS) and below.
- (b) Data on species for which specific thresholds are developed should be included in deriving generalized thresholds for species for which less data are available.
- (c) In deriving its take thresholds, NMFS should treat airgun arrays as a mixed acoustic type, behaving as a multi-pulse source closer to the array and, in effect, as a continuous noise source further from the array, per the findings of the 2011 Open Water Panel cited above. Take thresholds for the impulsive component of airgun noise should be based on peak pressure rather than on RMS.
- (d) Masking thresholds should be derived from Clark et al. (2009), recognizing that masking begins when received levels rise above ambient noise.¹⁹⁵

¹⁹² *Id.*; *see also* Expert Panel Review 2010.

¹⁹³ Madsen, P.T., Marine mammals and noise: Problems with root-mean-squared sound pressure level for transients, *Journal of the Acoustical Society of America* 117:3952-57 (2005).

¹⁹⁴ By "thresholds," we mean either bright-line thresholds or linear risk functions.

¹⁹⁵ Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009).

Second, the draft EIS fails to consider masking effects in establishing a 120 dB threshold for continuous noise sources. Some biologists have analogized the increasing levels of noise from human activities as a rising tide of “fog” that is already shrinking the sensory range of marine animals by orders of magnitude from pre-industrial levels.¹⁹⁶ As noted above, masking of natural sounds begins when received levels rise above ambient noise at relevant frequencies. Accordingly, NMFS must evaluate the loss of communication space – and consider the extent of acoustic propagation – at far lower received levels than the draft EIS currently employs.

Third, the draft EIS entirely fails to consider the impacts of sub-bottom profilers and other active acoustic sources commonly featured in deep-penetration seismic and shallow hazard surveys. As NMFS’s Open Water Panel has suggested, some sub-bottom profilers used in Arctic surveys have source levels and frequency ranges approaching that of certain active military sonar systems, with shorter intervals between pings.¹⁹⁷ These source levels far exceed the 200 dB (RMS) threshold that the draft EIS considers “high intensity” when analyzing broadband sound¹⁹⁸; similarly, they exceed the threshold level of acoustic sources that NMFS includes in its take analyses of naval activities.¹⁹⁹ For purposes of authorizing mid-frequency sonar training, NMFS assumes that harbor porpoises are taken at received levels above 120 dB (RMS); and recent studies of killer whales and beaked whales, for example, indicate high levels of take at 140 dB (RMS) and below.²⁰⁰ Regardless of the risk function it ultimately uses, NMFS must include these additional acoustic sources in its take analysis.

¹⁹⁶ Bode, M., Clark, C.W., Cooke, J., Crowder, L.B., Deak, T., Green, J.E., Greig, L., Hildebrand, J., Kappel, C., Kroeker, K.J., Loseto, L.L., Mangel, M., Ramasco, J.J., Reeves, R.R., Suydam, R., Weilgart, L., Statement to President Barack Obama of Participants of the Workshop on Assessing the Cumulative Impacts of Underwater Noise with Other Anthropogenic Stressors on Marine Mammals (2009); Clark, C., and Southall, B., Turn down the volume in the ocean, *CNN.com*, Jan. 20, 2012, *available at* www.cnn.com/2012/01/19/opinion/clark-southall-marine/index.html; *see also* McDonald, M.A., Hildebrand, J.A., and Wiggins, S.M., Increases in deep ocean ambient noise in the Northeast Pacific west of San Nicolas Island, California, *Journal of the Acoustical Society of America* 120: 711-718 (2006).

¹⁹⁷ *See* Expert Panel Review 2011.

¹⁹⁸ DEIS at 4-41.

¹⁹⁹ *See, e.g.*, 74 Fed. Reg. 4,844 (Jan. 27, 2009); U.S. Navy, Final Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement (2008).

²⁰⁰ *Id.*; Tyack, P.L., Zimmer, W.M.X., Moretti, D., Southall, B.L., Claridge, D.E., Durban, J.W., Clark, C.W., D’Amico, A., DiMarzio, N., Jarvis, S., McCarthy, E., Morrissey, R., Ward, J., and Boyd, I.L., Beaked whales respond to simulated and actual Navy sonar, *PLoS ONE* 6(3):e17009.doi:10.13371/journal.pone.0017009 (2011) (beaked whales); Miller, P.J., Kvadsheim, P., Lam, F.-P.A., Tyack, P.L., Kuningas, S., Wensveen, P.J., Antunes, R.N., Alves, A.C., Kleivane, L., Ainslie, M.A., and Thomas, L., Developing dose-response relationships for the onset of avoidance of sonar by free-ranging killer whales (*Orcinus orca*), presentation given at the Society for Marine Mammalogy Biennial Conference, Tampa, Florida, Dec. 2, 2011 (killer whales); Miller, P., Antunes, R., Alves, A.C., Wensveen, P., Kvadsheim, P., Kleivane, L., Nordlund, N., Lam, F.-P., van IJsselmuide, S., Visser, F., and Tyack, P., The 3S experiments: studying the behavioural effects of navy sonar on killer whales (*Orcinus orca*), sperm whales (*Physeter macrocephalus*), and long-finned pilot whales (*Globicephala melas*) in Norwegian waters, Scottish Oceans Institute Tech. Rep. SOI-2011-001, *available at* soi.st-andrews.ac.uk (killer whales). *See also, e.g.*, Fernández, A., Edwards, J.F., Rodríguez, F., Espinosa de los Monteros, A., Herráez, P., Castro, P., Jaber, J.R., Martín, V., and Arbelo, M., ‘Gas and Fat Embolic Syndrome’ Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals, *Veterinary Pathology* 42:446 (2005); Jepson, P.D., Arbelo, M., Deaville, R., Patterson, I.A.P., Castro, P., Baker, J.R., Degollada, E., Ross, H.M., Herráez, P., Pocknell, A.M., Rodríguez, F., Howie, F.E., Espinosa, A., Reid, R.J., Jaber, J.R., Martín, V., Cunningham, A.A., and Fernández, A., Gas-Bubble Lesions in Stranded Cetaceans, 425 *Nature* 575-576 (2003); Evans, P.G.H., and Miller, L.A., eds., Proceedings of the Workshop on Active Sonar and Cetaceans (2004) (European Cetacean Society publication); Southall, B.L., Braun, R., Gulland, F.M.D., Heard, A.D., Baird, R.W., Wilkin, S.M., and Rowles, T.K.,

C. No consideration of combined effects

Here as elsewhere, the draft EIS's analysis is anemic. After spending 20 pages listing all of the Arctic activities that are reasonably foreseeable to occur over the next five years – an astonishing degree of oil and gas development, commercial shipping, coastal development, and military activities – the document presents a highly repetitive, mechanical, and ultimately empty analysis.²⁰¹ Indeed, for virtually every entry under each alternative, the draft EIS does little more than restate its conclusions from the previous chapter about the magnitude of the alternatives' impacts. To the extent that it does make new findings – recognizing, for example, that exploration activities in the Canadian Beaufort Sea can impact the project area²⁰² and that concurrent surveys could produce a greater risk of hearing loss or injury than are presently accounted for through NMFS's criteria²⁰³ – it does nothing to incorporate those findings into a biologically meaningful analysis.

In short, the draft EIS makes no attempt to analyze the cumulative and synergistic effects of masking, energetic costs, stress, hearing loss, or any of the other impact mechanisms identified over the last several years,²⁰⁴ whether for its own action alternatives or for the combined set of activities expected to flood the Arctic. While it argues that some impacts lie beyond our current ability to assess, it fails to incorporate methods and analysis that are presently available:

- (1) Qualitative assessment.— Over the last several years, the scientific community has identified a number of pathways by which anthropogenic noise can affect vital rates and populations of animals. These efforts include the 2005 National Research Council study, which produced a model for the Population Consequences of Acoustic Disturbance; an ongoing Office of Naval Research program whose first phase has advanced the NRC model; and the 2009 Okeanos workshop on cumulative impacts.²⁰⁵ The draft EIS employs none of these methods, and hardly refers to any biological pathway of impact.
- (2) Models of masking effects.— As noted above, bioacousticians at NOAA and Cornell have developed a quantitative model to assess loss of communication

Hawaiian Melon-Headed Whale (*Peponacephala electra*) Mass Stranding Event of July 3-4, 2004 (2006) (NOAA Tech. Memo. NMFS-OPR-31).

²⁰¹ DEIS at 4-439 to 4-458.

²⁰² *Id.* at 4-469.

²⁰³ *Id.* at 4-470.

²⁰⁴ National Research Council, *Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects* (2005); Wright, A.J. ed., *Report on the workshop on assessing the cumulative impacts of underwater noise with other anthropogenic stressors on marine mammals: from ideas to action*, proceedings of workshop held by Okeanos Foundation, Monterey, California, August 26-29, 2009 (2009).

²⁰⁵ *Id.*

space over time from both commercial shipping and seismic exploration.²⁰⁶ Incredibly, the draft EIS does not model for masking effects.

- (3) Energetics.— Researchers have studied the impacts of various types of noise on the foraging success of killer whales and sperm whales. Both species were shown to experience significant decrements in foraging, of 18-19% and greater, within areas of obvious biological importance.²⁰⁷ The draft EIS fails to consider the impacts of noise on foraging and energetics; indeed, despite its own recognition that animals who remain in their feeding grounds may suffer adverse impacts over time,²⁰⁸ it repeatedly characterizes “observed” impacts as minor and short-term²⁰⁹. Based on the published evidence, the draft EIS should conservatively assume that animals that are not evidently displaced from their feeding grounds nonetheless experience a significant decrement in foraging, of at least 20%, at received levels of 140 dB and greater.
- (4) Chronic noise.— We are aware of at least three efforts to quantify cumulative noise levels in the Beaufort and Chukchi seas: of the three, one is concluded, and one will conclude this spring. The first, a passive acoustic monitoring study conducted by Scripps, found that at far distances seismic exploration significantly boosted ambient noise on the Chukchi Sea continental shelf and dominated frequencies below 100 Hz more than half of the time.²¹⁰ The second is NOAA’s working group on cumulative noise mapping, which is incorporating seismic exploration into its open-season chronic noise map of the American Arctic. The draft EIS has not incorporated this quantitative information into its cumulative impact analysis, or indicated that it will do so.
- (5) Stress.— Following from studies on terrestrial mammals, stress from ocean noise—alone or in combination with other stressors—may weaken a cetacean’s immune system, interfere with brain development, increase the risk

²⁰⁶ Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009).

²⁰⁷ Lusseau, D., Bain, D.E., Williams, R., and Smith, J.C., Vessel traffic disrupts the foraging behavior of southern resident killer whales *Orcinus orca*, *Endangered Species Research* 6: 211-221 (2009); Williams, R., Lusseau, D. and Hammond, P.S., Estimating relative energetic costs of human disturbance to killer whales (*Orcinus orca*), *Biological Conservation* 133: 301-311 (2006); Miller, P.J.O., Johnson, M.P., Madsen, P.T., Biassoni, N., Quero, M., and Tyack, P.L., Using at-sea experiments to study the effects of airguns on the foraging behavior of sperm whales in the Gulf of Mexico, *Deep-Sea Research I* 56: 1168-1181 (2009). See also Mayo, C.S., Page, M., Osterberg, D., and Pershing, A., On the path to starvation: the effects of anthropogenic noise on right whale foraging success, North Atlantic Right Whale Consortium: Abstracts of the Annual Meeting (2008) (finding that decrements in North Atlantic right whale sensory range due to shipping noise have a larger impact on food intake than patch-density distribution and are likely to compromise fitness).

²⁰⁸ DEIS at 4-99.

²⁰⁹ E.g., *id.* at 4-479.

²¹⁰ Roth, E.H., Hildebrand, J.A., Wiggins, S.M., and Ross, D., Underwater ambient noise on the Chukchi Sea continental slope, *Journal of the Acoustical Society of America* 131:104-110 (2012).

of myocardial infarctions, depress reproductive rates, cause malformations and other defects in young, all at moderate levels of exposure.²¹¹ Because physiological stress response is highly conserved across species, it is reasonable to assume that marine mammals would be subject to the same effects, particularly if, as here, they are exposed repeatedly to noise from oil and gas exploration and other stressors.²¹² Indeed, a recent New England Aquarium study of North Atlantic right whales, the closest relative of the bowhead whale, indicates that shipping noise alone can induce chronic stress in marine mammals.²¹³ The draft EIS, while acknowledging the potential for chronic stress to significantly affect marine mammal health, and while expecting that anthropogenic noise would induce physiological stress responses in marine mammals, does not incorporate chronic stress into its cumulative impact analysis, such as by using other species as proxies for lower life expectancies.

The data already show that industrial noise can disrupt biologically significant behavior and shrink whale communication range on a region-wide scale. As Dr. Chris Clark (Cornell) postulated in a report of the International Whaling Commission's Scientific Committee, such repeated and persistent acoustic insults over the large areas affected by airgun surveys alone should be considered enough to cause population-level impacts in at least some species of marine mammals.²¹⁴ The draft EIS's summary conclusions to the contrary are made without support, and without even attempting to address data gaps through methods accepted within the scientific community.²¹⁵

D. Potential for death and serious injury

The draft EIS improperly dismisses the risk of mortality and serious injury from acoustic impacts. *First*, the draft EIS fails entirely to consider the adverse synergistic effect that at least some types of anthropogenic noise can have on ship-strike risk. Mid-frequency sounds with frequencies in the range of some sub-bottom profilers have been shown to cause North Atlantic right whales to break off their foraging dives and lie just below the surface, increasing the risk of

²¹¹ See, e.g., Chang, E.F., and Merzenich, M.M., Environmental Noise Retards Auditory Cortical Development, 300 *Science* 498 (2003) (rats); Willich, S.N., Wegscheider, K., Stallmann, M., and Keil, T., Noise Burden and the Risk of Myocardial Infarction, *European Heart Journal* (2005) (Nov. 24, 2005) (humans); Harrington, F.H., and Veitch, A.M., Calving Success of Woodland Caribou Exposed to Low-Level Jet Fighter Overflights, *Arctic* 45:213 (1992) (caribou).

²¹² A special issue of the *International Journal of Comparative Psychology* (20:2-3) is devoted to the problem of noise-related stress response in marine mammals. For an overview published as part of that volume, see, e.g., A.J. Wright, N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C. Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L. Weilgart, B. Wintle, G. Notarbartolo di Sciarra, and V. Martin, Do marine mammals experience stress related to anthropogenic noise? (2007).

²¹³ Rolland, R.M., Parks, S.E., Hunt, K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K., and Kraus, S.D., Evidence that ship noise increases stress in right whales, *Proceedings of the Royal Society B: Biological Sciences* doi:10.1098/rspb.2011.2429 (2012).

²¹⁴ IWC Scientific Committee, Report of the 2004 Scientific Committee of the International Whaling Commission, Annex K: Report of the Standing Working Group on Environmental Concerns (2004).

²¹⁵ 40 C.F.R. § 1502.22. See also Bejder, L., Samuels, A., Whitehead, H., Finn, H., and Allen, S., Impact assessment research: use and misuse of habituation, sensitization and tolerance in describing wildlife responses to anthropogenic stimuli, *Marine Ecology Progress Series* 395:177-185 (2009).

vessel strike.²¹⁶ A similar risk for bowhead whales must be considered here. *Second*, as noted above (and contrary to representations in the draft EIS), a number of recent studies indicate that anthropogenic sound can induce permanent threshold shift at lower levels than anticipated.²¹⁷ Hearing loss remains a significant risk where, as here, the agency has not required aerial or passive acoustic monitoring as standard mitigation, appears unwilling to restrict operations in low-visibility conditions, and has not firmly established seasonal exclusion areas for biologically important habitat.

Third, the draft EIS wrongly discounts the potential for marine mammal strandings, even though at least one stranding event, the September 2002 stranding of beaked whales in the Gulf of California, is tightly correlated with geophysical survey activity; and even though high-intensity sounds in general have long been used by drive fisheries to force marine mammals ashore.²¹⁸ *Fourth*, and finally, as noted above, the draft EIS makes no attempt to assess the long-term effects of chronic noise and noise-related stress on life expectancy, although terrestrial animals could serve as a proxy. The agencies' reliance on monitoring for adaptive management, and their assurance that activities will be reassessed if serious injury or mortality occurs, is inappropriate given the probability that even catastrophic declines in Arctic populations would go unobserved.²¹⁹

As the Ninth Circuit has found, “the considerations made relevant by the substantive statute during the proposed action must be addressed in NEPA analysis.”²²⁰ Here, in assessing their MMPA obligations, the agencies presuppose that industry will apply for IHAs rather than five-year take authorizations and that BOEM will not apply to NMFS for programmatic rulemaking. But the potential for mortality and serious injury bars industry from using the incidental harassment process to obtain take authorizations under the MMPA.

In 1994, Congress amended the MMPA to add provisions that allow for the incidental harassment of marine mammals through IHAs, but only for activities that result the “taking by harassment” of marine mammals.²²¹ 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.”²²² Accordingly, NMFS’s implementing regulations state that an IHA in the Arctic cannot be used for “activities

²¹⁶ Nowacek, D.P., Johnson, M.P., and Tyack, P.L., North Atlantic right whales (*Eubalaena glacialis*) ignore ships but respond to alerting stimuli, *Proceedings of the Royal Society of London, Part B: Biological Sciences* 271:227 (2004).

²¹⁷ Kastak, D., Mulsow, J., Ghoul, A., Reichmuth, C., Noise-induced permanent threshold shift in a harbor seal [abstract], *Journal of the Acoustical Society of America* 123: 2986 (2008); Kujawa, S.G., and Liberman, M.C., Adding insult to injury: cochlear nerve degeneration after “temporary” noise-induced hearing loss, *Journal of Neuroscience* 29:14077-14085 (2009).

²¹⁸ Brownell, R.L., Jr., Nowacek, D.P., and Ralls, K., Hunting cetaceans with sound: a worldwide review, *Journal of Cetacean Research and Management* 10: 81-88 (2008); Hildebrand, J.A., Impacts of anthropogenic sound, in Reynolds, J.E. III, Perrin, W.F., Reeves, R.R., Montgomery, S., and Ragen, T.J., eds., *Marine Mammal Research: Conservation beyond Crisis* (2006).

²¹⁹ Taylor, B.L., Martinez, M., Gerrodette, T., Barlow, J., and Hrovat, Y.N., Lessons from monitoring trends in abundance of marine mammals, *Marine Mammal Science* 23:157-175 (2007).

²²⁰ *ONDA*, 625 F.3d at 1109.

²²¹ 16 U.S.C. § 1371(a)(5)(D)(i).

²²² *See id.* § 1371(a)(5)(A).

that have the *potential* to result in serious injury or mortality.”²²³ 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.²²⁴

The caution exhibited by NMFS in promulgating the 1996 regulations is consistent with the MMPA’s general approach to marine mammal protection. 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.”²²⁵ 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[.]”²²⁶ Thus, the 1994 amendments preserved the existing five-year regulation process for those activities that risked the possibility of lethal or seriously injurious marine mammal take.

Given the clear potential for serious injury and mortality, few if any seismic operators in the Arctic can legally obtain their MMPA authorizations through the IHAs process. BOEM should consider applying to NMFS for a programmatic take authorization, and NMFS should revise its impact and alternatives analyses in the EIS on the assumption that rulemaking is required.

V. SPECIES OF CONCERN

As highlighted throughout these comments, there are multiple faults with the analysis of marine mammals impacts in the draft EIS. A few are repeated here but also discussed are those points that are specific to particular marine mammals. In combination, these errors result in a serious underestimation of potential effects.

A. Bowheads

The draft EIS assumes away the possibility of substantial harm to the bowhead whale population despite potentially high levels of oil and gas exploration, the known sensitivity of bowhead whales, and critical missing information. In its conclusion for Alternative 2, the draft EIS concedes that there could be “varying degrees” of disturbance to bowhead feeding, resting, and migrating whales “depending on actual level of effort, type of activity, time of year, and whether the activities run concurrent in the Beaufort and Chukchi seas.”²²⁷ Because the extent of

²²³ 50 C.F.R. § 216.107 (emphasis added).

²²⁴ 60 Fed. Reg. 28,379, 28,380-81 (May 31, 1995).

²²⁵ H.R. Rep. 92-707, at 5 (1971) *reprinted in* 1972 U.S.C.C.A.N. 4144, 4148.

²²⁶ H.R. Rep. 103-439, at 37 (1994).

²²⁷ DEIS at 4-110. There is very little discussion of the combined effects of drilling and ice management. *See id.* at 4-103. As raised in comments recently submitted to NMFS for its exploration drilling proposed IHAs, ice management can significantly expand the extent of a disturbance zone. *See Alaska Wilderness League, et al., Comments on Taking Marine Mammals Incidental to an Exploration Drilling Program Near Camden Bay, Beaufort Sea, AK* (Dec. 7, 2011) (Beaufort Sea IHA Cmts); *Alaska Wilderness League, et al., Comments on Taking Marine Mammals Incidental to an Exploration Drilling Program in the Chukchi Sea, Alaska* (Dec. 9, 2011) (Chukchi Sea IHA Cmts), attached as Exhs. 4 and 5. Nor do the “conceptual examples” provided by the draft EIS reflect the 20-30 kilometer deflection zone discussed in the text for bowhead whales. *Compare* DEIS at 4-103 *with id.*, Figures

the impact will “depend on the number of exploration activities and associated support vessels in an area,” the draft EIS shifts its focus to “individual” sound sources, finding that those impacts are likely to be of medium intensity, localized, and temporary.²²⁸ The draft EIS then simply concludes, without analysis, that “[e]valuated collectively” the overall effect of the activities will be moderate.²²⁹ This is not the hard look at direct and indirect impacts that NEPA requires.²³⁰

The draft EIS finds that as much as 25% of the EIS project area could be exposed to sound levels of 120 dB from the exploration activities, a level known to provoke significant behavioral reactions in migrating bowhead whales.²³¹ Multiple activities could result in large numbers of bowheads potentially excluded from feeding habitat for the duration of the survey.²³² And the exploration activities may take place year-after-year over the life of the EIS, with a “high likelihood” of drilling around Camden Bay.²³³ Under the circumstances, there is a threat of biologically significant effects that the draft EIS must further explore.²³⁴

Instead, it appears that the conclusions of the draft EIS rest largely on the fact that the bowhead whale population has grown in the face of past oil and gas exploration activities.²³⁵ The draft EIS, however, makes little effort to examine the extent of past activities or the amount of noise produced as compared to what is projected by the alternatives.²³⁶ The draft EIS must

4.3-1 and 4.4-2. It is also unclear how the virtually non-existent disturbance zones for exploratory drilling in the Chukchi Sea were determined for Figure 4.4-2. *Cf. id.* at 4-49 (discussing a default of 10 km for 120 dB).

²²⁸ *Id.* at 4-110 – 4-111.

²²⁹ *Id.* at 4-111. This failure to consider the full effect of the multiple disturbances that are under consideration is a pervasive failing of the draft EIS. Nor does the draft EIS attempt to apply its impact descriptors collectively. The draft EIS concedes that because exploration activities can continue for several years the duration of the effects on the “acoustic environment” should be considered “long term,” but this overview is absent from the bowhead assessment. *Cf.* 4-51. And if bowheads must consequently avoid exploration activities across much of their fall migration route the impact extends far beyond “localized.”

²³⁰ *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 811 (9th Cir. 1999) (criticizing “very broad and general statements devoid of specific, reasoned conclusions” in an EIS).

²³¹ DEIS at 4-51 (acoustic impacts); 4-99 (bowhead reaction to seismic surveying noise); 4-103 (bowhead reaction to drilling noise). Southall et al., 2007 at 446, 452. *See also* 76 Fed. Reg. 68,974, 68,988 (Nov. 7, 2011) (noting “strong” avoidance reactions). The draft EIS maintains that data are not available to determine whether female bowheads with calves react differently than other segments of the population. DEIS at 4-104. Although the data are not bowhead specific, NMFS has observed in the past female baleen whales with calves typically are more responsive to disturbances. *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). Any potential impacts on females and calves merit “special consideration.” *Id.* at 110. The ability of the 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.” *Id.*

²³² DEIS at 4-100.

²³³ *Id.* at 4-103.

²³⁴ *See, e.g., id.* at 4-121 (“NMFS is concerned these simultaneous seismic activities could result in effects that are biologically significant for bowhead whales in particular.”); 2008 BiOp at 68 (stating that “[s]mall deflections in individual bowhead swimming paths and a reduction in use of possible feeding areas near exploration units may result in adverse effects on the species”).

²³⁵ DEIS at 4-110.

²³⁶ *Id.* at 4-443 (briefly discussing past oil and gas activity in the Alaskan Arctic); 4-480 – 4-481 (past activities and bowhead whales). NMFS has found that due to the “incompleteness” of the data, it could not evaluate the totality of past effects on bowheads. 2010 BiOp at 50. The draft EIS further suggests that the stock has increased even despite

also consider the fact that the bowhead population may be approaching carrying capacity, potentially altering the degree to which it can withstand repeated disturbances.²³⁷ The superficial nature of the assessment is reinforced by the lack of substantives analysis for Alternative 3 despite adding four additional seismic surveys, four shallow hazard surveys, and two drilling programs to the totals in Alternative 2.²³⁸

As noted throughout these comments, the extent of missing information in the Arctic is daunting and this holds equally true for bowhead whales. The long-term effects of disturbance on bowheads are unknown.²³⁹ The potential for increased stress is unknown, and it is unknown whether impulsive sounds “affect the reproductive rate or distribution and habitat use over a period of days or years.”²⁴⁰ Although there are some data indicting specific habitat use in the Beaufort Sea, information is especially lacking to determine where bowhead aggregations occur in the Chukchi Sea.²⁴¹ What is known about the sensitivity of bowhead whales to sound and disturbance indicates that the zones of influence for a single year that included as many as twenty-one surveys, four drillships, and dozens of support vessels – including ice management vessels – would be considerable and almost certainly include important habitat areas.²⁴² The assumption that the resulting effects over five years would be no more than “moderate” is unsupported.

B. Beluga

NMFS must first evaluate whether enough is known about beluga whales and their habitat use to accurately predict the degree of harm expected from multiple years of exploration activity.²⁴³ Even if the data are deemed sufficient, the analysis of direct and indirect effects in the draft EIS does not support the conclusion that the impact on beluga whales would be no more than moderate.

In the discussion of potential effects from 2D and 3D surveying the draft EIS speculates, based on studies of captive whales and airgun frequencies, that belugas may be “insensitive” to such sounds.²⁴⁴ And yet when discussing “similar” OBC surveying the draft EIS recognizes that effects “may extend 20-30 km” from the source.²⁴⁵ Indeed, to bolster the claim that beluga whales are unlikely to suffer auditory injury because they tend to avoid loud noise, the draft EIS affirms that recent monitoring studies “have confirmed that belugas remained further [sic] away

present levels of oil and gas activity, but the most recent estimate of the population – based on photographic data – is from 2004. *See id.* at 3-89.

²³⁷ DEIS at 3-89 (carrying capacity); *see also* Beaufort Sea IHA Cmts, Statement of Dr. David Bain, Exh. 4.

²³⁸ DEIS at 4-254 – 4-256.

²³⁹ *Id.* at 4-110.

²⁴⁰ *Id.* at 4-100.

²⁴¹ LS 193 FSEIS 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).

²⁴² Effects of disturbance on bowhead whales related to important habitat areas are discussed in the text, *supra*.

²⁴³ *See, e.g.*, 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”).

²⁴⁴ DEIS at 4-111.

²⁴⁵ *Id.* at 4-112.

from seismic operations than has been shown for other odontocetes[.]”²⁴⁶ Beluga whales’ strong reactions to higher frequencies also make plain the failure of the draft EIS to calculate ensonified zones for sub-bottom profilers, side scan sonar, and echosounders.²⁴⁷ Curiously, the draft EIS does not discuss beluga whales’ well-documented reaction to ships and ice breakers in the context of surveying with ice breaker support or exploratory drilling.²⁴⁸ As raised in comments submitted to NMFS for the Shell’s Arctic exploration drilling proposed IHAs, ice management activity has the potential to disturb significant numbers of beluga whales.²⁴⁹

The draft EIS makes very little effort to estimate where and when beluga whales might be affected by oil and gas activities despite NMFS registering its concern for “biologically significant” effects.²⁵⁰ BOEM has similarly 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.”²⁵¹ The draft EIS naturally finds that potential impacts would relate to “the numbers and types of individuals that were affected . . . and to whether areas avoided or from which whales are potentially displaced provide important energetic needs for belugas particularly during their spring and autumn migrations.”²⁵² Yet the draft EIS does not attempt such an analysis. There is no assessment of how many beluga whales may be harassed by the total number of authorized activities, where that harassment might take place, or what segment of the population could be the most vulnerable. To the extent that this information is available, the draft EIS must incorporate it into the analysis.²⁵³ Where it is not, the draft EIS must apply the framework required by the CEQ regulations.

C. Seals

Again, as with a number of marine mammals in the Arctic, “[t]here is a basic lack of information about ice seals.”²⁵⁴ Moreover, portions of the ringed and bearded seal populations have been proposed for listing pursuant to the Endangered Species Act (ESA), and the ribbon

²⁴⁶ *Id.* at 4-113. *See also* 76 Fed. Reg. 30,110, 30,126 (May 24, 2011) (finding that belugas appear to be “fairly responsive” to seismic energy).

²⁴⁷ DEIS at 4-112.

²⁴⁸ *See id.* at 4-111 – 4-112 (seismic with ice breaker support); 4-113 (exploratory drilling).

²⁴⁹ Beaufort Sea IHA Cmts at 12; Chukchi Sea IHA Cmts at 12.

²⁵⁰ DEIS at 4-114.

²⁵¹ LS 193 FEIS at IV-154.

²⁵² DEIS at 4-114.

²⁵³ *Id.* at 3-100 – 3-102 (describing known information regarding timing and location of habitat use). As with the bowhead whales, the draft EIS asserts that available information does not indicate “long-term adverse effects” on the beluga whale stocks during the 1980s. *Id.* at 4-114 – 4-115. The draft EIS does not provide any context for this claim or any citation in support. *Id.*

²⁵⁴ USGS Report at 187; *see also id.* (“Key information about the abundance, distribution, and vital aspects of ice seals is incomplete”); Lindow, Emily, NOAA, Email to Joseph C. Talbot, BOEMRE, Re. 1001-03b and 1101-02a(2) Camden Bay EP– Draft EA Review at 113 (July 28, 2011) (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”), attached as Exh. 6; DEIS at 4-123 (“Very few data are available on the reactions of pinnipeds to echosounder sounds or other devices at frequencies similar to those used during seismic operations.”); *id.* (“It is not known if multiple disturbances within a certain timeframe add to the stress of an animal and, if so, what frequency and intensity may result in biologically important effects.”).

seal is considered a “species of concern” under the ESA.²⁵⁵ The proposed listings were prompted, in part, by the effects of climate change on ice seal habitat.²⁵⁶ The added stress of diminishing habitat should form a greater part of the draft EIS analysis. A recent outbreak of skin lesions and sores among ringed seals, accompanied by higher than normal levels of mortality, further complicates any assessment.²⁵⁷ The potentially weakened state of the populations should be considered as part of the baseline.

Even if all the ice seal populations were robust, allowing additional offshore industrial activity risks harm. Low-frequency noise can mask biologically significant sounds, and the proposed activities will disrupt normal behavior, causing seals not only to flee preferred habitat but expend extra energy in doing so.²⁵⁸ NMFS also should consider whether ice management or ice breaking have the potential to seriously injure or kill ringed seals resting on pack ice.²⁵⁹ Hanna Shoal has been noted as an important feeding habitat for bearded seals, and as noted in Shell’s recent exploration plan ice “often” accumulates between its Chukchi drill sites and the Shoal, requiring active ice management.²⁶⁰ In general, the seal analysis – as with many other sections of the draft EIS – does a poor job of considering how the aggregated effects of multiple activities might cause harm.

When assessing potential effects on seal prey species, the draft EIS maintains that that fish will resume normal behavior “within minutes or a few hours” after seismic surveying.²⁶¹ As discussed, *supra*, this conclusion ignores existing studies on the effects of seismic surveying on fish that indicate that effects will last considerably longer over relatively wide areas.

D. Polar Bear

Global warming has caused Arctic sea ice – polar bears’ primary habitat – to melt at an increasingly rapid rate, raising concerns about its long-term chances for survival. Classified as a threatened species under the ESA, the polar bear is also protected by international conservation agreements.²⁶² As with bowhead whales, this globally iconic species plays a critical role in Arctic indigenous cultures.

Disturbance to denning bears is a particular concern. The IUCN Polar Bear Specialist Group cautioned that “Expansion of wintertime Petroleum exploration and development in the

²⁵⁵ See 75 Fed. Reg. 77,496 (Dec. 10, 2010); 75 Fed. Reg. 77,476 (Dec. 10, 2010).

²⁵⁶ See 75 Fed. Reg. at 77,511-12 (discussing sea ice losses); 75 Fed. Reg. at 77,492 (same).

²⁵⁷ NOAA, 2011 Arctic Seal Disease Outbreak Fact Sheet (updated Nov. 22, 2011) (Arctic Seal Outbreak Fact Sheet), available at <http://alaskafisheries.noaa.gov/protectedresources/seals/ice/diseased/ume022012.pdf>. NMFS has officially declared an “unusual mortality event” for ringed seals.

²⁵⁸ See 2008 Multi-Sale DEIS at 4-185 – 4-186.

²⁵⁹ *Id.* at 4-181; *cf.* 76 Fed. Reg. 69,958, 69,985 (Nov. 9, 2011) (discussing seals and ice management). The addition of a second exploration drilling program in Alternative 3 would add at least two more ice breakers to the Chukchi Sea. *Cf.* DEIS at 4-261 (asserting that changes to ice habitat would be the same for Alternative 3).

²⁶⁰ DEIS at 4-303 (seals and Hanna Shoal); Shell, Revised OCS Lease Exploration Plan, Chukchi Sea, Alaska, Appendix F at 4-57 (May 2011) (Chukchi EIA), available at http://alaska.boemre.gov/ref/ProjectHistory/2012_Shell_CK/2012x_.HTM.

²⁶¹ DEIS at 4-127.

²⁶² U.S. FWS Polar Bear Fact Sheet at 2, available at

http://www.fws.gov/home/feature/2009/pdf/polar_bearfactsheet1009.pdf

Arctic has increased concerns that oil and gas activities could disturb denning polar bears, resulting in premature den abandonment and cub mortality.”²⁶³ On-ice surveys may directly disrupt nursing polar bears in their dens. Bears disturbed while nursing or awakened from their winter slumber have been known to abandon their dens as a result, placing the cubs at risk. Undetected dens may also suffer physical harm from machinery used during seismic surveys that can literally crush them beneath the snow. Ringed seals, which also make their lairs on the ice, are also susceptible to disturbances from these surveys.²⁶⁴

Recent research indicates that as the ice melts sooner polar bears are forced to return to land earlier in the summer.²⁶⁵ The earlier the bears return to land, the more likely they are to be impacted by summer seismic and other activities in the water, onshore support of open water activities, and any oil spills that might occur. These impacts will be more severe for subadult bears, which are likely to be the first to return to land as sea ice retreats.²⁶⁶ “Because of the greater maternal investment a weaned subadult represents, reduced survival rates of subadult polar bears have a greater impact on population growth rate and sustainable harvest than reduced litter production rates.” Thus, impacts to subadults that return to land in summer represent potentially major impacts to polar bear populations and should be considered in any final EIS.²⁶⁷

The draft EIS’s reliance on future mitigation measures required by the FWS and undertaken by industry is unjustified. It refers to measures “typically” required through the MMPA and considers that it is in industry’s “self-interest” to avoid harming bears.²⁶⁸ Without more, the draft EIS cannot simply assume that claimed protections resulting from the independent efforts of others will mitigate for potential harm.²⁶⁹

E. Walrus

Many of the issues relevant to effects on walrus have been raised in the context of other marine mammals as well. The extent of the missing information is vast, as well summarized in the USGS Report:

²⁶³ IUCN/SSC Polar Bear Specialist Group. In N.J. Lunn, S. Schliebe, and E.W. Born (eds.), *Polar bears: Proceedings of the 13th Working Meeting of the IUCN Polar Bear Specialist Group*. P. 2135. IUCN, Gland, Switzerland and Cambridge, U.K.

²⁶⁴ The draft EIS recognizes that the disturbance or dispersion of prey species of ice seals could have effects on polar bears but given the questions raised, *supra*, regarding potential effects on seals, the dismissal of potential harm is unwarranted. DEIS at 4-138.

²⁶⁵ Durner, G. M., et al., Predicting 21st-century polar bear habitat distribution from global climate models. *Ecological Monographs*, 79(1):25–58 (2009).

²⁶⁶ R. F. Rockwell, L. J. Gormezano, The early bear gets the goose: climate change, polar bears and lesser snow geese in western Hudson Bay, *Polar Biology*, 32:539–547 (2009).

²⁶⁷ LS 193 FEIS at IV-168.

²⁶⁸ DEIS at 4-134, 4-138.

²⁶⁹ “Mitigation must ‘be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated.’” *Carmel-By-the-Sea v. U.S. Dep’t of Transp.*, 123 F.3d 1142, 1154 (9th Cir.1997) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989)). As NMFS previously counseled BOEM’s predecessor, an EIS “should propose and evaluate a suite of specific mitigation measures” rather than “defer that mitigation and analysis to subsequent actions by NMFS and FWS at some point in the future.” NMFS Multi-Sale FEIS Cmts at 3; *see also id.* at 13 (asserting that relying on the MMPA “abdicates” responsibility for analyzing effects).

Information gaps include: population size; stock structure; foraging ecology in relation to prey distributions and oceanography; relationship of changes in sea ice to distribution, movements, reproduction, and survival; models to predict the effects of climate change and anthropogenic impacts; and improved estimates of harvest. Impacts to walrus of changes in Arctic and subarctic ice dynamics are not well understood.²⁷⁰

Walrus are also expected to suffer greatly from the effects of climate change, and the FWS found that listing pursuant to the ESA is warranted.²⁷¹ In December, the FWS also determined that walrus, like ringed seals, were experiencing an “unusual mortality” event.²⁷²

The draft EIS indicates that large groupings of walrus have been encountered during exploration activities in the Chukchi Sea.²⁷³ Nor is it uncommon for individuals to be exposed to high levels of seismic energy.²⁷⁴ The draft EIS references the “limited geographic extent” of ice breaking activities, but it does not consistently recognize that multiple ice breakers could operate as a result of the exploration drilling programs.²⁷⁵ The draft EIS does observe that the importance of any displacement will depend on the quality of benthic habitat for feeding walrus and its proximity to pack ice or haulouts on land.²⁷⁶ As noted in the draft EIS, it is presumably “more cost effective to haul out near the productive feeding areas and expend less energy traveling[.]”²⁷⁷ Hanna Shoal is recognized as a high quality (“important”) feeding ground for walrus,²⁷⁸ and exploration drilling occurring in proximity will require ongoing ice management.²⁷⁹ The draft EIS appears to diminish any such effects as “short-term,” as they would last “a few weeks to a few months.”²⁸⁰ Yet the draft EIS does not provide any reference to support the notion that losing access to important habitat for months at a time would constitute an insignificant occurrence.²⁸¹

In all, the great number of unknowns, the already stressed population, the large numbers of walrus found in the Chukchi Sea, the importance of Hanna Shoal, and the possible length of

²⁷⁰ USGS Report at 57.

²⁷¹ 76 Fed. Reg. 7,634, 7,634 (Feb. 10, 2011). However, the FWS simultaneously found that listing the Pacific walrus is currently precluded by higher priority actions. *Id.*

²⁷² See Arctic Seal Outbreak Fact Sheet.

²⁷³ DEIS at 4-130. The movement of walrus has been affected by the changing ice conditions in the Arctic. Encounters with walrus in the water have increased in recent years “primarily in the fall when the pack ice recedes beyond the shelf break into water too deep for walrus to forage.” *Id.* at 4-490.

²⁷⁴ *Id.* at 4-131.

²⁷⁵ *Id.* at 4-131; 4-263 (“the amount of ice breaking activity [under Alternative 3] would be similar to Alternative 2.”).

²⁷⁶ *Id.* at 4-306 (Hanna Shoal); 4-132 (productive feeding areas).

²⁷⁷ *Id.* at 3-117.

²⁷⁸ *Id.* at 4-306.

²⁷⁹ See Chukchi EIA at 4-57.

²⁸⁰ DEIS at 4-132.

²⁸¹ The draft EIS finds in other contexts that displacement over a matter of weeks could result in biologically significant impacts to marine mammals. See DEIS at 4-121 (bowhead whales); 4-114 (beluga whales). The analysis in the draft EIS for Alternative 3 highlights the general failure to consider the collective impact of different activities. For example, although it notes the minimum separation distance for seismic surveys, no such impediment exists for separating surveying and exploration drilling, along with its accompanying ice breaking activities. See DEIS at 4-263.

exploration activity displacement all indicate the potential for serious effects. The draft EIS does not adequately confront these concerns.²⁸²

F. Gray whales

The draft EIS's analysis for gray whales is faulty in a number of respects. In part, gray whales appear to have suffered from being grouped into a general analysis as one of a number of "other" cetaceans, including fin, minke, and killer whales, and harbor porpoise.²⁸³ More attention specific to gray whales is needed.

The USGS report notes that more information is needed concerning the gray whale's "spatial and temporal habitat needs" during its summers in the Chukchi Sea.²⁸⁴ The Chukchi Sea is "of primary interest because it is a major feeding ground for the gray whale[.]"²⁸⁵ The draft EIS claims instead, without support, that the gray whale "feeding and migration patterns fairly closely mimic those of bowhead whales, therefore, gray whales are expected to be exposed to similar potential effects."²⁸⁶ Unlike the bowhead whale annual migration between the Bering Sea and the Canadian Beaufort, the gray whale migration route extends far south to Mexico and typically goes no farther than the Chukchi Sea.²⁸⁷ And, unlike bowhead whales, they are primarily benthic feeders, relying on shallow coastal areas and shoals.²⁸⁸ Perhaps based on its misconception of gray whale habitat use, the analysis of the effects for Alternatives 2 and 3 does not discuss either the gray whale's reliance on the Chukchi Sea for its feeding or its documented preference for Hanna Shoal.²⁸⁹

The same is true for the analysis of the habitat protections in Alternative 4. The draft EIS notes that there are potential benefits to gray whales from protections in and around Hanna Shoal.²⁹⁰ Gray whales can be disturbed by very low levels of industrial noise, with feeding disruptions occurring at noise levels of 110 dB.²⁹¹ As noted, *supra*, ice management activities associated with exploration drilling could very well take place proximate to Hanna Shoal. Yet when discussing the possibility that area closures could concentrate effects elsewhere, the draft EIS focuses on the Beaufort Sea, "such as on the Beaufort shelf between Harrison Bay and Camden Bay during those time periods."²⁹² The draft EIS does so despite recognizing that – of the cetaceans under consideration – habitat protective measures "are most likely to impact gray

²⁸² As with the analysis of effects on polar bears, the draft EIS improperly relies on measures that may be required through the MMPA. DEIS at 4-134 (referencing mitigation measures required by FWS LOAs). The draft EIS also notes that the MMPA assures that impacts will remain "negligible" but does not confront how that term applies in the context of its impact scale. *Id.* at 3-116.

²⁸³ DEIS at 4-115.

²⁸⁴ USGS Report at 185.

²⁸⁵ *Id.*

²⁸⁶ DEIS at 4-118; *see also id.* at 4-121 (Gray whales have "similar migration and life histories" to bowhead whales).

²⁸⁷ *See* USGS Report at 53; *id.* at 184 (Gray whales are a "rare occurrence" east of Barrow in the Beaufort Sea).

²⁸⁸ DEIS at 3-99.

²⁸⁹ *See* 76 Fed. Reg. at 70,000 (characterizing Hanna Shoal, a "common gray whale feeding ground."); DEIS at 4-115 – 4-121 (Alternative 2); 4-258 – 4-259 (Alternative 3).

²⁹⁰ *Id.* at 4-302 (closure would reduce adverse effects, "especially those associated with noise disturbance, such as displacement, particularly on gray whales").

²⁹¹ *Id.* at 4-118.

²⁹² *Id.* at 4-303.

whales and less likely to impact the remaining cetaceans in the resource group, due to species distribution.”²⁹³

In another instance of overreliance on comparisons to bowhead whales, the draft EIS states that both populations have increased despite previous exploration activities.²⁹⁴ Gray whale numbers, however, have declined since ESA protections were removed in 1994, and there is speculation that the population is responding to environmental limitations.²⁹⁵ Further straining the analogy, in the past, exploration activities were less frequent in the Chukchi Sea.

G. Harbor Porpoise

As noted *supra*, harbor porpoise are extremely sensitive to noise and disturbance.²⁹⁶ In order to comply with NEPA, the draft EIS must also address the fact that the unofficial Bering Sea “stock” is based on “arbitrarily set geographic boundaries.”²⁹⁷ The draft EIS 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.²⁹⁸ Smaller stocks of a species tend to be more vulnerable to harm caused by human activities.²⁹⁹ Although the draft EIS acknowledges in the oil spill context that harbor porpoise (along with gray whales) have “higher relative abundance” in the Chukchi Sea compared to other marine mammals, there is very little analysis of noise and other disturbance that is specific to the species.³⁰⁰

H. Fish

Although the draft EIS admits that airgun surveys can significantly degrade catch rates in commercial fisheries, and cause “numerous” other impacts on Arctic fish species, it substantially understates the scale of impact and fails to consider any measures to mitigate their effects.³⁰¹

Airgun surveys are known to significantly affect the distribution of some fish species, which can impact fisheries and could also displace or reduce the foraging success of marine mammals that rely on them for prey. Indeed, as one study has noted, fishermen in various parts of the world have complained for years about declines in their catch rates during oil and gas airgun surveys, and in some areas have sought industry compensation for their losses.³⁰² Airguns

²⁹³ *Id.*

²⁹⁴ *Id.* at 4-118.

²⁹⁵ *Id.* at 3-98 (“These abundance trends are consistent with a population approaching carrying capacity[.]”).

²⁹⁶ Moreover, based on tests of a captive harbor porpoise, the draft EIS noted that some cetaceans “apparently can incur TTS at considerably lower sound exposures than are necessary to elicit TTS in the beluga or bottlenose dolphin.” DEIS at 4-114.

²⁹⁷ LS 193 FEIS at III-78 – III-79.

²⁹⁸ *Id.* at 3-106; Chukchi Sea IHA Cmts, Statement of Dr. David Bain at 14-15, Exh. 5. Shell’s recent EIA for exploratory drilling in the Chukchi indicates that the Bering Sea group of harbor porpoise has been estimated at 16,271. Chukchi EIA at 3-78. The draft EIS admits that there “is no reliable information on trends in abundance for this stock.” DEIS at 3-106.

²⁹⁹ Chukchi Sea IHA Cmts, Statement of Dr. David Bain at 15, 16.

³⁰⁰ DEIS at 4-487.

³⁰¹ *Id.* at 4-74.

³⁰² McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K., Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of

have been shown experimentally to dramatically depress catch rates of some commercial fish species, by 40 to 80% depending on catch method, over thousands of square kilometers around a single array.³⁰³ Large-scale displacement is likely to be responsible for the fallen catch rates: studies have shown both horizontal (spatial range) and vertical (depth) displacement in a number of other commercial species on a similar spatial scale.³⁰⁴ Impacts on fisheries were found to last for some time beyond the survey period, not fully recovering within 5 days of post-survey monitoring.³⁰⁵ Airguns also have been shown to substantially reduce catch rates of rockfish, at least to the distances (less than 5 km) observed in the experiment.³⁰⁶ Yet the draft EIS – which acknowledging that displacement can increase the risk of predation, disrupt fish spawning and reproduction, alter migration routes, and impact feeding – appears to assume without support that effects on both fish and fisheries would be localized.

Furthermore, high-intensity noise from airguns and other sources can impact fish in numerous other ways. Like marine mammals, fish use sound for communication, homing, and other important purposes, and, like marine mammals, they can experience temporary or permanent hearing loss on exposure to intense sound.³⁰⁷ Even brief playbacks of predominantly low-frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.³⁰⁸ Other impacts on commercially harvested fish include reduced reproductive performance: recent data suggest that loud, low-frequency sound may disrupt chorusing, a behavior essential to breeding, in some commercial species.³⁰⁹ Several studies indicate that airgun noise can kill or decrease the viability of fish eggs and larvae.³¹⁰

air-gun exposure on humpback whales, sea turtles, fishes and squid (2000) (industry-sponsored study undertaken by researchers at the Curtin University of Technology, Australia).

³⁰³ Engås, A., Løkkeborg, S., Ona, E., and Soldal, A.V., Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*), *Canadian Journal of Fisheries and Aquatic Sciences* 53: 2238-2249 (1996); see also Løkkeborg, S., Ona, E., Vold, A., Pena, H., Salthaug, A., Totland, B., Øvredal, J.T., Dalen, J. and Handegard, N.O., Effects of seismic surveys on fish distribution and catch rates of gillnets and longlines in Vesterålen in summer 2009 (2010) (Institute of Marine Research Report for Norwegian Petroleum Directorate).

³⁰⁴ Slotte, A., Hansen, K., Dalen, J., and Ona, E., Acoustic mapping of pelagic fish distribution and abundance in relation to a seismic shooting area off the Norwegian west coast, *Fisheries Research* 67:143-150 (2004).

³⁰⁵ Engås *et al.*, Effects of seismic shooting.

³⁰⁶ Skalski, J.R., Pearson, W.H., and Malme, C.I., Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes spp.*), *Canadian Journal of Fisheries and Aquatic Sciences* 49: 1357-1365 (1992).

³⁰⁷ McCauley *et al.*, Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure; McCauley, R., Fewtrell, J., and Popper, A.N., High intensity anthropogenic sound damages fish ears, *Journal of the Acoustical Society of America* 113: 638-642 (2003); see also Scholik, A.R., and Yan, H.Y., Effects of boat engine noise on the auditory sensitivity of the fathead minnow, *Pimephales promelas*, *Environmental Biology of Fishes* 63: 203-209 (2002).

³⁰⁸ Purser, J., and Radford, A.N., Acoustic noise induces attention shifts and reduces foraging performance in three-spined sticklebacks (*Gasterosteus aculeatus*), *PLoS One*, 28 Feb. 2011, DOI: 10.1371/journal.pone.0017478 (2011).

³⁰⁹ Clark, C.W., pers. comm. with M. Jasny, NRDC (Apr. 2010) (unpublished data on disruption of drum fish chorusing by low-frequency shipping noise).

³¹⁰ Booman, C., Dalen, J., Leivestad, H., Levsen, A., van der Meer, T., and Toklum, K., Effekter av luftkanonskyting på egg, larver og yngel (Effects from airgun shooting on eggs, larvae, and fry), *Fisken og Havet* 3:1-83 (1996) (Norwegian with English summary); Dalen, J., and Knutsen, G.M., Scaring effects on fish and harmful effects on eggs, larvae and fry by offshore seismic explorations, in Merklinger, H.M., *Progress in Underwater Acoustics* 93-102 (1987); Banner, A., and Hyatt, M., Effects of noise on eggs and larvae of two estuarine fishes, *Transactions of the American Fisheries Society* 1:134-36 (1973); L.P. Kostyuchenko, Effect of

In short, the draft EIS improperly assumes that no offshore fishing occurs in the region, fails to recognize the scale of seismic survey impacts on fish species, does not assess impacts of decreased prey availability on marine mammals, ignores the potential for acoustic impacts on Essential Fish Habitat – and, finally, fails to consider measures to mitigate these impacts, such as excluding surveys from spawning areas and other areas of biological importance to Arctic fish species. NMFS must improve its scant analysis.³¹¹

VI. FAILURE TO ADEQUATELY CONSIDER EFFECTS OF OIL SPILLS

A major oil spill in Arctic waters would have crippling effects on the ecosystem, wildlife and people in the Arctic. Spilled oil could kill or severely injure marine mammals and their prey – including whales, seals, polar bears, walrus, seabirds, fish, and microorganisms – and could destroy what are for now pristine waters and shorelines. It could render subsistence resources unusable for multiple years. All of these impacts likely would have a dramatic, negative effect on the people who depend on these animals and places. There is no proven technology to clean up a spill in the remote, icy conditions of the Arctic Ocean, and a spill at the wrong time could continue unchecked for months under the winter sea ice before attempts could be made to stop it.

A. Chukchi Sea

For the Chukchi Sea very large oil spill (VLOS) analysis, the draft EIS relies extensively on the Final Supplemental EIS (FSEIS) for lease sale 193. The FSEIS’s analysis suffers from a number of flaws which render it inadequate to fully inform the decisions underlying NMFS’s draft EIS. Considered as a whole, the analysis in the FSEIS and the draft EIS fails to assist decisionmakers or the public understand the real-world consequences of a VLOS and fails to draw conclusions relevant to decisions about whether, where, and under what circumstances to allow oil and gas exploration activities in the Arctic to go forward.

The oil spill analysis in the lease sale 193 FSEIS is based on a recapitulation of the results of an oil spill trajectory model without explaining what the results mean in terms of effects in the real world. Appendix B of the FSEIS states that, unlike previous analyses that BOEM has conducted, in its large spill trajectory analysis “it is not estimated that any one trajectory brings oil to that location.”³¹² Rather, “the number of trajectories contacting an

elastic waves generated in marine seismic prospecting on fish eggs on the Black Sea, *Hydrobiology Journal* 9:45-48 (1973).

³¹¹ Additionally, the agencies must consider the impacts of seismic surveys and other activities on invertebrates.

See, e.g., McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K., Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid (2000); André, M., Solé, M., Lenoir, M., Durfort, M., Quero, C., Mas, A., Lombarte, A., van der Schaar, M., López-Bejar, M., Morell, M., Zaugg, S., and Houégnigan, L., Low-frequency sounds induce acoustic trauma in cephalopods, *Frontiers in Ecology and the Environment* doi:10.1890/100124 (2011); Guerra, A., and Gonzales, A.F., Severe injuries in the giant squid *Architeuthis dux* stranded after seismic explorations, in German Federal Environment Agency, International Workshop on the Impacts of Seismic Survey Activities on Whales and Other Marine Biota at 32-38 (2006);

³¹² LS 193 FSEIS at B10.

individual resource over the total number of trajectories launched is used to calculate the percent chance of a hypothetical large spill trajectory contacting that resource.”³¹³

This approach to the model results does not provide adequate information about the effects of an oil spill in the Chukchi Sea. A VLOS would involve “multiple trajectories over time with each trajectory launched regularly as the well continued to flow.”³¹⁴ The “conditional probabilities” in the FSEIS thus “represent how many trajectories come to that location described as percent trajectories (number of trajectories contacting/total number of trajectories launched).”³¹⁵ It is unclear, however, exactly what the “percent of trajectories” tells decision makers and the public about the actual behavior of a VLOS.³¹⁶

Moreover, by reciting model results for each environmental resource in isolation, the FSEIS fails to draw conclusions about the risk to the environment *overall* posed by a spill at any of the areas under consideration. NMFS’s EIS must synthesize the oil spill information in a manner that presents the information relevant to the decision about authorizing future exploration activities – namely, the severity of the consequences from oil spills originating in different areas of the Chukchi Sea.³¹⁷

The draft EIS’s discussion of shoreline oiling is similarly inadequate. The draft EIS indicates that 5-30% of spilled oil would be expected to reach the shore and that hundreds of miles of shoreline “could” be contaminated.³¹⁸ This assessment, however, does not detail the harm from spills that occur in different locations, and the analyses cited in the draft EIS do not fill in the necessary information. The lease sale 193 FSEIS provides only a composite of how much shoreline might be “discontinuous[ly]” oiled from a spill originating anywhere in the region under consideration.³¹⁹ While this may predict the extent of shoreline oiling for oil spills of different durations, it does not provide information about impacts from oil spills originating

³¹³ *Id.*

³¹⁴ *Id.*

³¹⁵ *Id.*

³¹⁶ *Id.*

³¹⁷ The analysis in the draft EIS that is intended to supplement the lease sale 193 FSEIS adds little. For example, the sections on bowhead and beluga whales state only that effects could be “major.” DEIS at 4-389. If anything, the passages tend to reinforce the need for additional information. *See id.* (“If the area is an important feeding area, such as off Barrow, or along the migratory corridor, especially in the spring lead system, the impacts may be of higher magnitude.”); *id.* at 4-394 (noting that if oil entered Kasegaluk Lagoon, effects could be major).

³¹⁸ DEIS at 4-372; 4-383. The draft EIS assumes that 10-40 percent of the spilled oil would be recovered or reduced and that as much as 25-40 percent would naturally disperse, evaporate, or dissolve. *Id.* at 4-355. NMFS should reconsider its claims regarding the recovery rate. *See* Pew Environment Group, Comments on Shell Offshore Inc.’s 2011 – Revised OCS Lease Exploration Plan, Camden Bay, Beaufort Sea, Alaska, and Revised Beaufort Sea, Regional Exploration Oil Discharge Prevention and Contingency Plan at 25-27 (July 25, 2011) (Pew Letter), attached as Exh. 7. Further, it is not clear that NMFS considered whether the ice and lower water temperatures of the Arctic will significantly slow weathering processes such as evaporation. BOEM, 2012-2017 Outer Continental Shelf Oil and Gas Lease Program Draft Environmental Impact Statement at 4-48 (2011) (Five-Year Plan DEIS). The draft EIS separately maintains that in situ burning may remove up to 90% of the spilled oil, a claim that is not justified by existing studies. *Compare* DEIS at 4-357 with Pew Letter at 33. The draft EIS appears to contemplate that burning would take place in the spring lead system, a potential disaster for marine mammals. DEIS at 4-358 – 4-359. Although the assumptions as to oil recovery are evidently not factored into the spill volume, they should nevertheless be corrected in any final EIS. *Id.* at 4-359.

³¹⁹ LS 193 FSEIS at 144 (Table 6).

from different wellsites, and potentially contacting different areas, species, and resources as a result.³²⁰ The draft EIS also cites to the 2012-2017 five-year leasing plan draft EIS in support of its discussion of impacts to terrestrial mammals as a result of oil reaching the shore, but the entire discussion in the five-year plan draft EIS appears to be little more than a paragraph with virtually no site-specific details.³²¹

B. Beaufort Sea

For the Beaufort Sea discussion, the draft EIS relies heavily on the analysis in the draft EIS for the 2012-2017 five-year plan and the analysis from the 2003 multi-sale EIS.³²² Collectively, the documents, including the additional analysis in the draft EIS, do not provide the information needed to determine the potential effects of a VLOS.

As with the Chukchi Sea discussion, the draft EIS does not provide sufficient information to determine whether and under what circumstances exploration should proceed and the environmental consequences of the various choices. The draft EIS expressly states that “no modeling was performed for the Beaufort Sea analysis.”³²³ Instead, it provides a generic summary of projected general impacts when large volumes of oil are released into the environment. As in the Chukchi Sea analysis, simply recognizing that impacts from a large spill will be “major” tells a decisionmaker very little about the options for shaping possible alternatives.³²⁴ Indeed, the failure to conduct any modeling at all appears to have led to some degree of confusion. At one point the draft EIS asserts that conditions in the Beaufort Sea would move oil “away from the shore” while otherwise claiming that prevailing winds over the course of a spill would “blow[] the oil onshore.”³²⁵

The draft EIS does, however, cite passages related to the trajectory model for a Beaufort Sea spill taken from the 2003 multi-sale EIS.³²⁶ NMFS’s reliance on that model as a prediction of the likelihood that a spill will contact particular sensitive areas is unjustified. Two assumptions of the trajectory model ensure that it cannot yield reasonable estimates of the absolute likelihood of oil contacting sensitive areas. First, the model assumes that all spills behave like a single point and move with the wind and current along a single path.³²⁷ Second, the model assumes that once the spill contacts the coast, it stops.³²⁸ In other words, it assumes that a spill can never contact the mainland at more than one place.

³²⁰ The DEIS also cites to “MMS 2007” for its estimation of when oil may reach the coastline. Presumably, this is a reference to the lease sale 193 FEIS, but it is unclear why NMFS does not rely on the supplemental EIS for the entire oil spill trajectory analysis. See DEIS at 4-355.

³²¹ Compare Five-Year Plan DEIS at 4-291 – 4-292 with DEIS at 4-395.

³²² DEIS at 4-347 (portions of the discussion in the draft EIS were “taken verbatim” from the five-year plan analysis); *id.* at 4-417 (citing to the 2003 Multi-Sale FEIS); 4-419 (same); 4-421 (same).

³²³ *Id.* at 4-416; 4-419.

³²⁴ See, e.g., DEIS at 4-422 (bowhead whales); 4-423 (beluga whales); 4-426 (Camden Bay).

³²⁵ Compare *id.* at 4-410 with *id.* at 4-416; 4-419. For the offshore claim, the DEIS cryptically refers to the theory of “Ekman transport” as part of its analysis, without explanation. DEIS at 4-410. In addition, more information beyond a generalized sense of wind direction is needed to determine the trajectory of a spill. See LS 193 FSEIS at B-8 (noting circulation models and 15-year analysis of wind data).

³²⁶ DEIS at 4-417 (fish habitat); 4-424 (Camden Bay).

³²⁷ 2003 Multi-Sale EIS at A-1-9.

³²⁸ *Id.* at A-1-10.

Unfortunately, the multi-sale EIS uses the model as if it provided a reasonable estimate of the absolute likelihood of contact, and the draft EIS appears to adopt the same assumption.³²⁹ The draft EIS, for example, quotes the multi-sale's use of "combined probabilities," that is, the percentages arrived at when the results of the trajectory model are adjusted to reflect the probability of a spill occurring in the first place.³³⁰ The misleading implication that the draft EIS is addressing absolute probabilities is even stronger in this instance.

Moreover, the "foundation" for the Beaufort Sea spill analysis, the 2012-17 five-year plan draft EIS, is still undergoing agency review.³³¹ A number of entities have submitted critical comments to BOEM, and the entire proposal may undergo substantial revisions – including to its oil spill analysis – before a final EIS is released. NMFS must consider the comments that BOEM received on the five-year plan draft EIS as well as the plan itself before extensively relying on the analysis.

C. Potential for death and serious injury

As discussed *infra*, activities with even the "potential" to result in serious injury or mortality must be authorized through MMPA regulations.³³² There can be little dispute that a VLOS occurring in the Arctic risks death and serious injury to scores of marine mammals.³³³

The draft EIS cites to what it considers a "very low" or "very small" likelihood of a spill.³³⁴ However, the risk of well-control incidents is substantially *higher* during exploration drilling activities than it is during development, as recently acknowledged by BOEM.³³⁵ The draft EIS notes that only that one VLOS has occurred on the outer continental shelf (OCS) since

³²⁹ See DEIS at 4-417; 4-424.

³³⁰ DEIS at 4-417 ("However, the combined probability of one or more spills occurring and contacting the nearshore area is very low (less than 0.5%)."). The 0.5% figure is also incorrect. The model estimates probability of contact to each of 66 individual land segments separately. To determine the probability of contact to the nearshore generally would require adding each of the individual probabilities. Instead, lease sale FEIS concludes that the risk of contact to the nearshore generally is less than 0.5% based on the fact that the risk of contact to any one of the 66 land segments is less than 0.5%.

³³¹ DEIS at 4-409.

³³² 50 C.F.R. § 216.107(a)

³³³ See, e.g., DEIS at 4-384 ("Exposure of aggregations of bowheads, especially if calves are present, could result in mortality"); 4-385 (Prolonged inhalation of toxic fumes or accidental inhalation of surface oil "could result in temporary and/or permanent injury or mortality" to beluga whales); 4-388 ("Any VLOS reaching a polynya or lead system could have serious effects on local ringed and bearded seal sub-populations, potentially oiling or even killing a number of bearded and/or ringed seals."); 4-390 ("A VLOS in the Chukchi Sea could have an overall moderate to major impact on gray whales."); 4-421 (projecting numbers of dead marine mammals); Lease Sale 193 FSEIS at 235-44 (discussing effects of a large spill on ice 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); see also DEIS at 4-421 (bowhead whales); 4-423 (beluga whales).

³³⁴ DEIS at 4-351.

³³⁵ LS 193 FSEIS at B2-B3. 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").

1971 (the *Deepwater Horizon*), but this does not fully take into account the work done by the Bercha group.³³⁶ Its most recent report indicates that blowouts that could spill large quantities of oil occur are a real risk during exploration drilling. For example, it finds that 3.5 out of every 10,000 exploration wells drilled in water between 30 and 60 meters deep would result in a well blowout equal to or greater than 150,000 barrels of oil.³³⁷ More than six out of every 10,000 would result in a blowout spill between 10,000 and 149,999 barrels of oil.³³⁸

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.³³⁹ The 2010 *Deepwater Horizon* disaster underscored the inherent risks of exploration drilling in frontier environments. The draft EIS acknowledges that human error “while working under extreme weather conditions on the Arctic OCS could increase the risk of loss of well control in certain circumstances where established procedures are not followed.”³⁴⁰ Although industry representatives routinely assert that companies have a strong economic incentives to avoid such incidents, three large oil offshore spills have occurred over the past year alone, all operated by Shell: the Shell *Godafoss* vessel oil spill in Norway near a national park-marine preservation area (5,000 barrels of oil) in February 2011,³⁴¹ the oil spill at Shell’s *Gannet Alpha* platform in the North Sea near Aberdeen, Scotland (1,300 barrels of oil) in August 2011,³⁴² and the oil spill at Shell’s *Bonga* facility in the Atlantic off the coast of Nigeria (40,000 barrels of oil) in December 2011.³⁴³ Most recently, there was a blowout on a North Slope exploratory well.³⁴⁴

VII. FAILURE TO ADEQUATELY CONSIDER ISSUES RELATED TO CLIMATE CHANGE

The analysis related to the effects of climate change is faulty in a two key respects: 1) the draft EIS fails to adequately consider how exploration activities could contribute to marine mammal harm in the context of a rapidly changing Arctic environment; and 2) the draft EIS fails

³³⁶ DEIS at 4-351. Versions of the report are cited in the final supplemental EIS for lease sale 193 and in the draft EIS itself. LS 193 FSEIS at B4; DEIS at 3-50, 4-363.

³³⁷ Bercha Group, *Alternative Oil Spill Occurrence Estimators and their Variability for the Beaufort Sea—Fault Tree Method*, OCS Study MMS 2008-035, at 4.30 (Table 4.17) (2008).

³³⁸ *Id.*

³³⁹ 75 Fed. Reg. at 77,487 (“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”).

³⁴⁰ DEIS at 4-363. The draft EIS asserts that the incident rate of loss of well control “is expected to be lower” than for operations in the Gulf of Mexico. *Id.* The report relied upon for this claim is discussed in the text, *infra*.

³⁴¹ Euronews, *Norway’s only marine reserve hit by oil spill* (Feb. 18, 2011), available at <http://www.euronews.net/2011/02/18/norway-s-only-marine-reserve-hit-by-oil-spill/>.

³⁴² Fiona Harvey, *North sea oil spill ‘worst for a decade’*, *The Guardian* (August 15, 2011), available at <http://www.guardian.co.uk/environment/2011/aug/15/north-sea-oil-spill>.

³⁴³ John Vidal, *Nigeria on alert as Shell announces worst oil spill in a decade*, *The Guardian* (Dec. 22, 2011), available at <http://www.guardian.co.uk/environment/2011/dec/22/nigerian-shell-oil-spill>.

³⁴⁴ Richard Mauer, *North Slope oil well suffers a blowout*, *Anchorage Daily News* (Feb. 16, 2012), available at <http://www.adn.com/2012/02/15/2319427/exploratory-well-blows-on-north.html>. The latter two spills occurred from low-tech sources, i.e., pipelines and hose transfer activities respectively, raising questions about industry’s ability to prevent major spills from well-understood technical processes in contrast to major spills from blowouts where there may be geologic unknowns.

to adequately consider the full range of future climate change impacts that could naturally flow from exploration activities.

A. Effects on species in the context of climate change

The Arctic is undergoing significant climactic changes, and models estimate that temperatures will increase by as much as 6° F by 2040.³⁴⁵ Warming temperatures have already visibly altered Alaska’s land, water, wildlife, and people.³⁴⁶ Perhaps the most dramatic change has been the disappearance of sea ice. “As a result of receding and thinning sea ice scientists have observed polar bears drowning and going hungry, walrus forced onto land, and sharp declines in numbers of ice-dependent sea birds.”³⁴⁷ As noted *supra*, a number of Arctic species have been listed pursuant to the ESA – or are proposed for listing – in part based on issues related to climate change. The warming is also threatening indigenous cultures. Arctic animals and subsistence hunts are central to Alaska Native cultures. Today, subsistence hunters have to travel farther to access animals.³⁴⁸ Melting permafrost is accelerating coastal erosion and forcing communities to relocate.³⁴⁹

The draft EIS contains only the barest attempt to consider harm to the Arctic ecology and its inhabitants in the context of climate change. In discussing marine mammals and climate change, the draft concedes that ice-obligate species such as walrus, ice seals, and polar bears are especially vulnerable.³⁵⁰ Indeed, recent shifts “in distribution and habitat use by polar bears and walrus in the Beaufort and Chukchi seas are likely attributable to loss of sea ice habitat.”³⁵¹ But the draft EIS does not in any real sense make use of this information. Examining possible harm to polar bear habitat from oil and gas operations, the draft EIS asserts only that they “would be negligible compared to the potential for dramatic sea ice loss due to climate change and changes in ecosystems due to ocean acidification.”³⁵² The draft EIS applies the same approach when looking at possible effects on subsistence.³⁵³ For walrus and ice seals, the draft EIS simply notes potentially catastrophic climate effects without adequately considering how oil and gas activities might leave species more vulnerable to that outcome.³⁵⁴

The EIS cannot avoid looking closely at possible harm to Arctic resources from the combination of oil and gas activities and climate change by diminishing the former in comparison to the latter. In either case, decisionmakers and the public are left with the impression that the agency action will not make much difference simply because the magnitude

³⁴⁵ See Anne E. Gore & Pamela A. Miller, Broken Promises: The Reality of Oil Development in America’s Arctic at 41 (Sep. 2009) (Broken Promises).

³⁴⁶ *Id.* at 40. The passing reference in the draft EIS that that climate change may be part of the “natural variability of climate patterns and fluctuations” is unsupported by any credible science and should be removed. See DEIS at 3-23.

³⁴⁷ Broken Promises at 41.

³⁴⁸ *Id.*

³⁴⁹ *Id.*

³⁵⁰ DEIS at 3-123. See also *id.* at 4-473 (noting that ocean acidification “must be considered in combination with actions that may lead to cumulative impacts”).

³⁵¹ *Id.* at 3-122 – 3-123.

³⁵² DEIS at 4-493 – 4-494. See also *id.* at 4-526 (polar bears and Alternative 3).

³⁵³ *Id.* at 4-501; 4-528.

³⁵⁴ *Id.* at 4-491 (noting that global warming presents the greatest threat to walrus); *id.* at 4-488 (ice seals; same).

of climate change is so large. This circumvents NEPA's purpose and prevents the consideration and adoption of solutions which could mitigate future harm.

B. Effects on climate change

1. *Future development and production*

The draft EIS cannot ignore the millions of tons of greenhouse gases that will be released in to the atmosphere as a result of the oil and gas that is produced as a result of the exploration activities authorized here. When examining the effects of exploration on the climate, the draft EIS rests on the fact that "it is not likely that there will be any oil or gas production in the Beaufort or Chukchi seas during the life of this document."³⁵⁵ This, however, does not reflect the obligation that NEPA places on agencies to consider future indirect effects of a proposed action. Indirect effects are those "caused by an action and are *later in time* or farther removed in distance, but are still reasonably foreseeable."³⁵⁶ The draft EIS recognizes that exploration can act as a "gateway for future offshore oil and gas development[.]"³⁵⁷ Or, more pointedly, the project "could promote or make more accessible the use of fossil fuels"³⁵⁸ As courts have recognized in the leasing context, "pumping oil" is the aim of congressional mineral leasing policy, and certainly that aim is even more relevant to the oil industry's efforts at the exploration stage.³⁵⁹

Although the draft EIS maintains at times that the likelihood of future production cannot be predicted and its magnitude is unknown, this willful ignorance disregards available information. The draft EIS can and must develop predictions based on existing estimates of oil and gas reserves. The lease sale 193 EIS assumes, for example, that one billion barrels will be produced as a result of the leasing for purposes of its environmental analysis.³⁶⁰ Reasonable forecasting and speculation are implicit in NEPA, and courts "reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.'"³⁶¹ To the extent that there may be some uncertainty, agencies must still "evaluat[e] . . . impacts based upon theoretical approaches . . . generally accepted in the scientific community."³⁶² The same is true for the effects of the emissions on the environment. The EIS cannot ignore those "actual impacts" that may result.³⁶³

³⁵⁵ *Id.* at 4-465; *id.* at 4-466 ("However, it cannot be foreseen that exploration activities being analyzed in this EIS would result in the production of oil and gas within the timeframe being analyzed."); 4-471 ("However, over the five-year lifespan of this EIS, climate change and ocean acidification are expected to have negligible effects on water quality in the EIS project area."); *see also id.* at 4-25 (indirect climate change impacts are anticipated to be "low").

³⁵⁶ 40 C.F.R. § 1508.8(b) (emphasis added).

³⁵⁷ DEIS at 4-504.

³⁵⁸ *Id.* at 4-514. *See also id.* at 4-503 (stating that the "possibility of the exploration activity leading to further development raises the possibility of health consequences subsequent to this further activity").

³⁵⁹ *Conner v. Burford*, 848 F.2d 1441, 1453 (9th Cir. 1988) (quotation marks omitted).

³⁶⁰ LS 193 FEIS IV-6. That estimation is far too low given projected reserves and the expected price of oil, but it at least represents an attempt to forecast future production. *See also* Five-Year Plan DEIS at 4-106 (Table 4.4.1-4).

³⁶¹ *Scientists' Inst. for Public Information, Inc. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

³⁶² 40 C.F.R. § 1502.22(b).

³⁶³ DEIS at 4-23. The draft EIS maintains that it is not "feasible" to do so, but the Environmental Protection Agency has modeled effects from even a single coal plant. *Id.* Letter from Robert Meyers to Dale Hall and Jim Lecky, Re: Endangered Species Act and Greenhouse Gas Emissions (Oct. 3, 2008), attached as Exh. 8.

2. Emissions of black carbon

The draft EIS fails to analyze the impact of black carbon outside of its VLOS scenario, disregarding emissions associated with increased vessel traffic and development infrastructure. Black carbon is generally regarded as the second most important driver of Arctic warming. It contributes to warming by absorbing incoming and outgoing radiation and by darkening snow and ice, “which reduces the reflection of light back to space and accelerates melting.”³⁶⁴ Emissions of black carbon from sources in the Arctic are particularly troubling because Arctic emissions can cause substantially more regional warming than similar amounts of black carbon emitted outside the Arctic.³⁶⁵

The Environmental Protection Agency (EPA) has recognized black carbon’s role in both global and Arctic warming. The Administrator has acknowledged that black carbon “is an important climate forcing agent and takes very seriously the emerging science on black carbon’s contribution to . . . the high rates of observed climate change in the Arctic.”³⁶⁶ Further, in a draft report to Congress on black carbon, EPA found that its “high capacity for light absorption and its role in key atmospheric processes link it to a range of climate impacts, including increased temperatures, accelerated ice and snow melt, and disruptions in precipitation patterns.”³⁶⁷ EPA states that modeling studies have shown that black carbon radiative forcing “from both atmospheric concentration and deposition on the snow and ice” has contributed to Arctic surface warming.³⁶⁸ One study found that black carbon deposition on sea ice “may have resulted in a surface warming trend of as much as 0.5 to 1°C.”³⁶⁹ Other modeling studies have shown increased warming of 0.4 to 0.5°C from black carbon deposited on snow; indicated that black carbon may increase snowmelt rates north of 50°N latitude by as much as 19 to 28 percent; and have revealed that black carbon forcing may be the cause of as much as 50 percent of Arctic sea ice retreat.³⁷⁰

Nor is the analysis of black carbon in the VLOS section itself sufficient. The draft EIS asserts that the magnitude of climate effects is “expected to be less than those associated with the actual oil exploration activities,” but the oil spill discussion does not attempt to quantify emission volumes and the section devoted to air impacts of exploration activities does not specifically address black carbon at all.³⁷¹

VIII. EFFECTS ON SUBSISTENCE

³⁶⁴ EPA, Report to Congress on Black Carbon External Peer Review Draft at 12-1 (March 2011) (Black Carbon Report), *available at* [http://yosemite.epa.gov/sab/sabproduct.nsf/0/05011472499C2FB28525774A0074DADE/\\$File/BC%20RTC%20External%20Peer%20Review%20Draft-opt.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/0/05011472499C2FB28525774A0074DADE/$File/BC%20RTC%20External%20Peer%20Review%20Draft-opt.pdf).

³⁶⁵ See D. Hirdman et al., *Source Identification of Short-Lived Air Pollutants in the Arctic Using Statistical Analysis of Measurement Data and Particle Dispersion Model Output*, 10 *Atmos. Chem. Phys.* 669 (2010).

³⁶⁶ 74 Fed. Reg. 66496, 66,520 (Dec. 15, 2009).

³⁶⁷ Black Carbon Report at 1-1.

³⁶⁸ *Id.* at 2-42.

³⁶⁹ *Id.*

³⁷⁰ *Id.* at 2-45.

³⁷¹ *Id.* at 4-366 – 4-367. Particularly in the case of black carbon, any final EIS may not avoid predicting “actual impacts” in the Arctic resulting from the project in favor of simply calculating emissions. *Id.* at 4-23.

In addition to the points already noted in these comments, issues that are particular to subsistence hunting require a more thorough analysis. Subsistence hunters are affected by industrial activities in ways that do not strictly correlate to the health of marine mammal populations. When marine mammals deflect away from exploration activities, hunting opportunities may be lost regardless of whether or not the deflection harms the species as a whole. Whalers are affected when bowhead whales become skittish or aggressive in the presence of noise producing activities.³⁷² A traditional subsistence diet can be disrupted as a result of exploration activities when there is even the perception that animals are tainted by discharges and other toxins.³⁷³

Despite these added complexities, the review of subsistence issues in the draft EIS is superficial and incomplete. The analysis for bowhead whales, for example, appears to rely on “additional” mitigation measures in the Chukchi Sea that are not required by the EIS.³⁷⁴ In discussing effects from ice management vessels, the subsistence section attempts to draw a distinction between “ice breaking” and “ice management” that is nowhere else described in the document.³⁷⁵ Ice management of any kind can have profound effects on marine mammal behaviors, as described *supra*. Although industry has in the past maintained that during “ice management” a slower rotation speed of a ship’s propeller reduces cavitation effects, the draft EIS does not cite to any evidence in support of such a claim.³⁷⁶ More importantly, such a claim is unjustified. First-year ice is most likely the type of ice to be encountered during open water activities, and there is evidence that such ice is “most efficiently broken at continuous high speed which involves the highest continuous power production[.]”³⁷⁷ As with effects on marine mammals generally, the analysis in the draft EIS repeatedly finds that disturbances to subsistence are “temporary” because they last only as long as the “duration of the activities” each season, ignoring that the draft EIS assumes that multiple authorizations will take place year after year.³⁷⁸

The draft EIS must also do more to address the potential for harm to coastal communities due to the perceived contamination of subsistence resources. The draft EIS cites to studies demonstrating that perceived contamination is a very real issue for local residents, and industrialization at the levels contemplated by the draft EIS would undoubtedly contribute to that belief.³⁷⁹ Yet the draft EIS avoids seriously confronting the issue. In discussing effects to subsistence hunting from permitted discharges, the draft EIS refers to the section on public health.³⁸⁰ The summary for the public health effects, however, refers to the entirety of the cumulative effects discussion.³⁸¹ That section appears to contain no more than a passing reference to the issue.³⁸² The examination of the mitigation measure that would require

³⁷² See 76 Fed. Reg. at 69,022.

³⁷³ DEIS at 4-209.

³⁷⁴ Compare DEIS at 4-181 (seismic surveying may not occur in the Chukchi Sea until bowhead hunts are complete); with DEIS at 2-41 – 2-42 (describing mitigation for subsistence hunting in the Chukchi Sea).

³⁷⁵ DEIS at 4-192.

³⁷⁶ See 76 Fed. Reg. at 69,960.

³⁷⁷ Shell, Outer Continental Shelf Pre-Construction Air Permit Application Revised, Frontier Discoverer Chukchi Sea Exploration Drilling Program at 16 (Feb. 23, 2009) (footnote omitted).

³⁷⁸ See, e.g., DEIS at 4-481 (bowhead whales); 4-482 (beluga whales)

³⁷⁹ *Id.* at 4-209.

³⁸⁰ DEIS at 4-197.

³⁸¹ *Id.* at 4-209.

³⁸² *Id.* at 4-512.

recycling of drilling muds fares no better. The section simply reinforces the fact that residents are very concerned about contamination without considering the benefits that could come from significantly reducing the volume of toxic discharges.³⁸³

Additional analysis is required related to deferral areas specific to subsistence hunting. As noted, NMFS has in the past recommended the deferral of leasing along the Chukchi Sea coast “until such time as it can be demonstrated that exploration and development activities in these sensitive regions can be accomplished without significant impacts to marine mammal populations *or* subsistence hunters.”³⁸⁴ Any final EIS must confront the potential need for added coastal protections in the Chukchi Sea.³⁸⁵

IX. OTHER CONCERNS

A. Effects on Air

The fleet of vessels and aircraft that may be utilized in the coming five years to conduct geophysical surveys and exploratory drilling in the Beaufort and Chukchi seas will emit large amounts of air pollution that could harm human health and the environment and significantly degrade the Arctic’s air quality. NEPA requires that any final EIS must analyze the effects of these substantial emissions.

1. *Recent amendments to the Clean Air Act*

As an initial matter, the draft EIS’s evaluation of potential air impacts is now outdated and likely substantially underestimates potential air quality impacts of future oil and gas activities in the Arctic. The draft EIS states that air quality in Alaska is regulated by EPA and the Alaska Department of Environmental Conservation and assumes that all future air pollution sources in the Arctic will be subject to EPA’s OCS regulations and air permitting requirements.³⁸⁶ Recent Congressional action, however, undercuts these assumptions. In late December 2011, Congress used a rider to the Consolidated Appropriations Act of 2012 to amend section 328 of the Clean Air Act (CAA).³⁸⁷ The rider changes the text of section 328 to exempt “Outer Continental Shelf sources located offshore of the North Slope Borough of the State of Alaska” from EPA’s CAA authority; instead, such sources will be subject to regulation by the Department of the Interior (DOI) pursuant to the Department’s statutory and regulatory authority.³⁸⁸ DOI’s regulations, now administered by BOEM, differ from EPA’s.³⁸⁹ Given the likelihood that at least some sources will not be subject to EPA regulations or air permitting

³⁸³ *Id.* at 4-204. NMFS should further consider whether a “no discharge” alternative could be justified on the basis of disruptions to subsistence due to perceived contamination. *Cf.* DEIS at 2-47.

³⁸⁴ NMFS Multi-Sale Cmts at 10 (emphasis added). NMFS has specifically argued that a 25-mile buffer is inadequate. *Id.* at 9.

³⁸⁵ NMFS should also consider an alternative that is designed primarily to benefit subsistence hunting (i.e., restrictions on activity timing/location and waste discharges).

³⁸⁶ *See, e.g.*, DEIS at 3-28 to 3-29, 4-26 to 4-32, and 4-35.

³⁸⁷ *See generally* Pub. L. No. 112-74 § 432.

³⁸⁸ *Id.* at § 432(b), (c). Activities with pending applications are unaffected. *Id.* § 432(d).

³⁸⁹ *Compare* 40 C.F.R. § 55 (EPA OCA air regulations) *with* 30 C.F.R. §§ 250.218, 250.302-303 (key DOI air regulations).

requirements, the draft EIS must be revised to reflect expected emissions under DOI's regulatory approach.

2. *Future air pollution authorizations*

Oil and gas activities in the Arctic generate several harmful air pollutants, including nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and particulate matter (PM), including fine particulate matter ("PM_{2.5}").³⁹⁰ The potential for offshore oil and gas activities to increase pollution levels in coastal communities in the Arctic is particularly worrisome as these communities already exhibit markedly higher rates of pulmonary disease than the general population, making them especially vulnerable to morbidity and mortality from air pollution.³⁹¹

The draft EIS states that "CO and PM are the pollutants of most concern in Alaska,"³⁹² but this statement is made without explanation or justification. In any event, whatever pollutants may be of the most significance within onshore areas of the state, other pollutants are certainly cause for concern in the offshore and coastal areas that will be most affected by oil and gas activities in the Arctic Ocean. For example, both NO_x emissions—which are regulated as nitrogen dioxide (NO₂)—and PM_{2.5} emissions pose a danger to coastal and near-coastal communities.

For example, for the company's planned operation of the *Discoverer* drillship, Shell admits that it will emit up to 336 tons per year of NO_x and up to 21 tons per year of PM_{2.5}.³⁹³ Both of these pollutants are harmful to human health. According to EPA, NO₂ acts mainly as an irritant affecting the eyes, nose, throat, and respiratory tract.³⁹⁴ "Continued exposure to high NO₂ levels can contribute to the development of acute or chronic bronchitis. Low level NO₂ exposure may cause increased bronchial reactivity in some asthmatics, decreased lung function in patients with chronic obstructive pulmonary disease and increased risk of respiratory infections, especially in young children."³⁹⁵ Exposure to elevated levels of particulate matter, especially PM_{2.5}, can cause adverse health effects even in healthy individuals.³⁹⁶ However, people with heart or lung disease, children, and the elderly are most vulnerable.³⁹⁷ "Numerous

³⁹⁰ DEIS at 4-25.

³⁹¹ See Environmental Protection Agency (EPA) Region 10, Supplemental Statement of Basis for Proposed OCS Prevention of Significant Deterioration Permits Noble Discoverer Drillship, Shell Offshore Inc., Beaufort Sea Exploration Drilling Program, Permit No. R10OCS/PSD-AK-2010-01, Shell Gulf of Mexico Inc., Chukchi Sea Exploration Drilling Program, Permit No. R10OCS/PSD-AK-09-01 at 65 (July 6, 2011) (*Discoverer Suppl. Statement of Basis 2011*), *available at* http://www.epa.gov/region10/pdf/permits/shell/discoverer_supplemental_statement_of_basis_chukchi_and_beaufort_air_permits_070111.pdf.

³⁹² DEIS at 3-28, 4-35.

³⁹³ EPA Region 10, Technical Support Document, Review of Shell's Supplemental Ambient Air Quality Impact Analysis for the Discoverer OCS Permit Applications in the Beaufort and Chukchi Seas at 8 (Jun. 24, 2011) (*Discoverer Technical Support Document*), *available at* http://www.epa.gov/region10/pdf/permits/shell/discoverer_ambient_air_quality_impact_analysis_06242011.pdf.

³⁹⁴ EPA, An Introduction to Indoor Air Quality: Nitrogen Dioxide, *available at*

<http://www.epa.gov/iaq/no2.html#Health Effects Associated with Nitrogen Dioxide>

³⁹⁵ *Id.*

³⁹⁶ EPA, Particulate Matter: Health, *available at* <http://www.epa.gov/oar/particlepollution/health.html>

³⁹⁷ *Id.*

scientific studies have linked particle pollution exposure to a variety of problems,” including development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease.³⁹⁸

As BOEM has acknowledged previously, “[a]irborne emissions from OCS activities could contribute incrementally to the risk of [chronic] health problems.”³⁹⁹ NMFS and BOEM must make a full assessment of the risks posed by the activities contemplated in the DEIS. The agencies should carefully analyze potential health effects, and may not simply rely on EPA’s (or BOEM’s) permitting process to prevent significant effects.⁴⁰⁰ Indeed, BOEM’s predecessor recognized this in the past, stating that

[e]missions [that] cause an increase in pollutants over an area of at least a few tens of square kilometers that exceeds half the increase permitted under the Prevention of Significant Deterioration [(PSD)] criteria or the National Ambient Air Quality Standards [(NAAQS)] for nitrogen dioxide, sulfur dioxide, or particulate matter less than 10 microns in diameter; or exceeds half the increase permitted under the [NAAQS] for carbon monoxide or ozone are significant for purposes of NEPA.⁴⁰¹

Using this criterion, expected air emissions from prospective oil and gas activities in the Arctic Ocean are plainly significant for purposes of NEPA. For example, emissions from Shell’s *Discoverer* are expected to exceed 24-hour concentrations of PM_{2.5} by 12.2 µg/m³ in the Beaufort Sea and 12.4 µg/m³ in the Chukchi Sea.⁴⁰² This increase easily exceeds EPA’s newly enacted 24-hour PM_{2.5} increment of 9 µg/m³.⁴⁰³ Likewise, *Discoverer* operations in the Chukchi are expected to increase 1-hour NO₂ concentrations from 13.2 µg/m³ to 174.0 µg/m³, an increase of 160.8 µg/m³ that greatly exceeds 50 percent of the NAAQS level of 188 µg/m³.⁴⁰⁴

Notably, air quality impacts from oil and gas activities may extend across large distances. For example, in its modeling for the 2010 air permit issued for Shell’s *Discoverer* operations in the Beaufort Sea, EPA determined that Shell’s operations would result in elevated annual NO₂ concentrations at a distance of more than 50 kilometers from the drillship; PM concentrations would remain elevated as far as 42 kilometers from the drillship.⁴⁰⁵ Because of the magnitude of expected emissions from oil and gas activities in the Arctic Ocean, as well as the expansive area that may be affected by a single source, NEPA requires a thorough analysis by NMFS and BOEM.

³⁹⁸ *Id.*

³⁹⁹ 2008 Multi-Sale DEIS Appendix J at J-12.

⁴⁰⁰ *S. Fork Band Council Of W. Shoshone Of Nevada v. U.S. Dept. of Interior*, 588 F.3d 718, 726 (9th Cir. 2009) (“A non-NEPA document . . . cannot satisfy a federal agency’s obligations under NEPA.”).

⁴⁰¹ 2003 Multi-Sale FEIS at IV-5.

⁴⁰² *Discoverer* Supp. Statement of Basis 2011 at 57-58.

⁴⁰³ 75 Fed. Reg. 64,864, 64,865 (Oct. 20, 2010).

⁴⁰⁴ *Discoverer* Supp. Statement of Basis 2011 at 58.

⁴⁰⁵ Region 10, Statement of Basis for Proposed OCS Prevention of Significant Deterioration Permit No. R10OCS/PSD-AK-2010-01, Shell Offshore Inc., Frontier *Discoverer* Drillship, Beaufort Sea Exploration Drilling Program at 98 (Feb. 17, 2010), available at ftp://ftp.epa.gov/reg10ftp/alaska/ocs/beaufort/air/shell/discoverer/2010/Proposed_Permit/.

NMFS and BOEM also must address air pollution impacts on wildlife and ecosystems. The DEIS, borrowing from a previous EPA analysis, focuses primarily on NAAQS compliance. While it is important that offshore oil and gas activities not violate NAAQS, such standards are intended, in the first instance, to protect human health. A source's NAAQS compliance does not preclude environmental consequences and some of the pollutants that will be emitted by offshore oil and gas sources have detrimental effects on the environment. For example, "air pollutants like NO₂ are eventually deposited in aquatic and terrestrial ecosystems, including habitat of rare and endangered species, resulting in acidification and nutrient enrichment that degrades these ecosystems and affects biodiversity."⁴⁰⁶ The draft EIS should address such environmental consequences of air pollution.

3. *Recent Arctic OCS air permits*

To the extent it attempts any meaningful analysis of air quality impacts, the DEIS is substantially flawed because it assumes that recent OCS air permits issued by EPA can be used to predict the impacts of other future oil and gas activities in the Beaufort and Chukchi seas.⁴⁰⁷ However, not all emissions associated with an operation are covered by an EPA OCS air permit. NMFS and BOEM are obligated to consider all emissions associated with oil and gas development, not merely those that are subject to direct regulation or permit conditions.

A brief discussion of the recently finalized air permits issued by EPA for Shell's *Discoverer* drillship illustrates the degree to which an OCS air permit fails to reflect the entirety of a source's air emissions and expected air impacts. EPA's air analysis for the *Discoverer* did not address, and the permit does not in any way limit, the following emissions: (1) emissions of the *Discoverer* drillship and associated vessels before the drillship becomes an "OCS source" (*i.e.*, before it is anchored); (2) emissions of the *Discoverer* drillship and associated vessels after the drillship ceases to constitute an "OCS source"; and (3) during the period that the *Discoverer* constitutes an OCS source, emissions from associated vessels operating at a distance of more than 25 miles from the drillship. The DEIS must address the cumulative impact of the air pollution emitted during each and every phases of the *Discoverer*'s operation, not just those emissions directly subject to permitting requirements

Even during the periods of operation directly subject to air permitting requirements, the air modeling developed for the *Discoverer* ignores the most severe impacts from the drillship and its associated fleet. EPA's air modeling for the *Discoverer* assumed that the air within a 500-meter of the drillship does not constitute "ambient air".⁴⁰⁸ In other words, based on nothing more than an arbitrary regulatory determination, EPA authorized a pollution bubble—one kilometer in diameter—within which Shell's emissions are fully unregulated.

The draft EIS acknowledges "the use of exclusion zones" around oil and gas activities and mistakenly suggests that such zones will prevent pollutant levels "above regulatory

⁴⁰⁶ See 76 Fed. Reg. 46,084, 46,103-05 (Aug. 1, 2011).

⁴⁰⁷ See DEIS at 4-35 ("Exhaustive modeling has been completed as part of the current draft permits for OCS exploratory drilling programs. Due to the similarities of those activities to the sources included in the project, estimates of impacts can be assessed based on the draft permit modeling results.").

⁴⁰⁸ *Discoverer* Supp. Statement of Basis 2011 at 26-27

standards.”⁴⁰⁹ As a factual matter, this conclusion is completely wrong. Air pollution levels are expected to be the highest within the exclusion zones;⁴¹⁰ in fact, concentrations are likely to exceed applicable standards there.⁴¹¹ Here, significant environmental impacts are expected within the exclusions zones. NEPA requires a full and transparent accounting of these impacts.

4. *Reliance on draft air permits*

The draft EIS’s citation to “current draft permits” to support its analysis of potential air quality impacts is inherently flawed because the document’s analysis appears to have drawn upon a single draft permit, namely, draft permit no. R10OCS020000 for a jackup rig that ConocoPhillips Company proposed in 2011 to use in the Chukchi Sea.⁴¹² This draft permit, issued in July of 2011, was later withdrawn after it was made subject to public comment—presumably because of the substantial technical and legal flaws identified by the public.⁴¹³ Given that draft permit no. R10OCS020000 was withdrawn, it is not an appropriate basis for the draft EIS’s air quality analysis.

Even had it not been withdrawn, the draft Conoco permit would not have provided a valid basis for predicting air impacts from future oil and gas activities in the Arctic. First, the draft permit violated applicable statutory and regulatory requirements and EPA’s analysis did not reliably identify the full potential impact of Conoco’s operations upon air quality.⁴¹⁴ Second, of the four OCS air permits proposed by EPA for the Arctic in 2011, Conoco’s operations were expected to produce the fewest air emissions.⁴¹⁵ Indeed, the Conoco permit relied upon by the DEIS is for only a minor source of air pollution for purposes of the CAA’s “Prevention of

⁴⁰⁹ DEIS at 4-35.

⁴¹⁰ Discoverer Supp. Statement of Basis 2011 at 59; *see also* Shell, OCS Pre-Construction Air Permit Application, Frontier Discoverer, Beaufort Sea Exploration Program at 166 (Jan. 2010), *available at* http://ftp.epa.gov/reg10ftp/alaska/ocs/beaufort/air/shell/discoverer/2010/Permit_Application_Materials_and_EPA_Responses/, (“peak Project contribution . . . occurs only 80 meters downwind of the drill site”).

⁴¹¹ Given that Shell’s proposed *Discoverer* operations within the Chukchi Sea are expected to barely comply with applicable standards at a radius of 500 meters, violations are possible if not likely within the 500 meter radius. *See* Discoverer Supp. Statement of Basis 2011 at 58 (noting that in the Chukchi Sea, the Discoverer’s total impact will amount to 93% of the 1-hour NO₂ national ambient air quality standard, 67% of 24-hour PM_{2.5} standard, and 60% of the 24-hour PM₁₀ standard).

⁴¹² DEIS at 4-31, n.10, n.19-21.

⁴¹³ *See* <http://yosemite.epa.gov/R10/airpage.nsf/Permits/conocophillips> (last visited Feb. 21, 2012) (“EPA proposed a draft Title V Clean Air Act permit on July 22, 2011, for ConocoPhillips to explore for oil and gas in the Chukchi Sea on the Outer Continental Shelf (OCS). ConocoPhillips withdrew their air permit application on Sept. 26, 2011 and submitted a new air permit application Dec. 1, 2011. On Jan. 27, 2012, ConocoPhillips withdrew their air permit application.”).

⁴¹⁴ *See* Alaska Wilderness League, *et al.*, Comments on Draft Title V Part 71 Air Permit for ConocoPhillips’s Proposed Oil and Gas Exploration Drilling in the Chukchi Sea, Alaska (Sept. 21, 2011), attached at Exh. 9.

⁴¹⁵ Conoco’s operations were projected to emit 207 tons per year (tpy) of NO_x. EPA Region 10, Statement of Basis for Draft OCS Title V Air Quality Operating Permit No. R10OCS020000, ConocoPhillips Company, Jackup Drill Rig, Chukchi Sea Exploration Drilling Program at 26 (July 22, 2011) (Conoco Statement of Basis). Operations for Shell’s *Kulluk* drilling unit are projected to emit 240 tpy of NO_x. EPA Region 10, U.S. EPA Region 10, Statement of Basis for Draft Outer Continental Shelf Permit to Construct and Title V Air Quality Operating Permit No. R10OCS030000, Shell Offshore Inc., Conical Drilling Unit Kulluk, Beaufort Sea Exploration Drilling Program at 24 (Jul. 20, 2011) (Kulluk Statement of Basis), *available at* http://www.epa.gov/region10/pdf/permits/ocs/shell/kulluk/SoB_Draft_072211_Public_Comment.pdf. Shell’s two *Discoverer* permits assume 336 tons of NO_x emissions annually. Discoverer Technical Support Document at 8.

Significant Deterioration” (PSD) program. The two air permits issued for Shell’s *Discoverer* drillship by contrast, are both for PSD major source operations. To analyze the expected impacts from oil and gas development in the Arctic, NMFS and BOEM must acknowledge the full size and emissions potential of the equipment that the oil companies intend to operate there. The approach utilized by the draft EIS—using lowball estimates from the smallest draft permit issued last year—is arbitrary and must be revised in accordance with the requirements of NEPA.

The draft EIS’s use of the Conoco permit is also improper because the draft EIS failed to acknowledge all of Conoco’s emissions and potential impacts. The draft EIS purports to include “a list of typical equipment” for an Arctic oil and gas survey or exploratory drilling.⁴¹⁶ The list set forth in the draft EIS is conspicuously incomplete, however, as it assumes that exploratory drilling can be conducted using only a single icebreaker.⁴¹⁷ Conoco’s proposed operations were expected to necessitate two icebreakers.⁴¹⁸ Indeed, the three other OCS air permits issued in 2011 also indicate the need for two icebreakers.⁴¹⁹ The failure of the draft EIS to account for the use of two icebreakers in each exploratory drilling operations is significant because the icebreakers are the largest source of air pollution associated with an exploratory drilling operation in the Arctic. For example, the two icebreakers that Shell intends to use with the *Discoverer* cumulatively will emit 3,200 pounds of NO_x pollution per day, whereas the drillship itself will only emit 710 pounds of NO_x per day.⁴²⁰ The draft EIS must be corrected to account for this error and the greater expected emissions associated with exploratory drilling operations.

5. Cumulative air impacts

The draft EIS wholly ignores potential cumulative impacts from oil and gas activities in the Arctic Ocean. NEPA requires an analysis of cumulative impacts. As it is currently written, the draft EIS only addresses the air impacts of a single, prospective oil and gas project. This approach ignores that multiple operations may operate in the same sea simultaneously. For example, the two OCS air permits issued for the *Discoverer* are not limited in duration, meaning that the drillship may operate contemporaneously with other operations that are, or should be, evaluated by the draft EIS. The draft EIS should therefore explicitly address the impacts of the *Discoverer* and its potential contribution to cumulative effects. Likewise, the OCS air permit issued by EPA for the *Kulluk* is valid for five years, meaning that its operations should be evaluated in detail as well.

Significantly, Shell and Conoco own lease blocks in close proximity to one another, greatly increasing the prospect of cumulative, harmful impacts from air pollution. An air permit application submitted by Conoco in 2010 indicates that the company may operate its drill rig only 25 kilometers away from oil and gas exploration activities planned by Shell.⁴²¹ Further,

⁴¹⁶ DEIS at 4-25.

⁴¹⁷ DEIS at 4-29, Table 4.5-4.

⁴¹⁸ Conoco Statement of Basis at 11-12 (noting the draft permits authorizes the use of two icebreakers).

⁴¹⁹ See *Discoverer* Supp. Statement of Basis 2011 at 32-33 (two icebreakers); *Kulluk* Statement of Basis at 15 (two icebreakers).

⁴²⁰ *Discoverer* Supp. Statement of Basis 2011 at 44.

⁴²¹ Conoco, OCS Air Permit Application, Chukchi Sea Devil’s Paw Prospect at L-20 (Feb. 2010), available at ftp://ftp.epa.gov/reg10ftp/alaska/ocs/chukchi/air/concocophillips/2010_permit_application_withdrawn/permit_application/.

with each of the operations' ice breakers and oil spill response vessels operating eight and sixteen kilometers away, respectively, the support vessels could be co-located in close proximity, creating a clear potential for significant cumulative impacts.⁴²² In light of these facts, the draft EIS's assumption that air quality impacts of individual oil and gas projects can be evaluated in isolation is plainly erroneous.

The draft EIS should be revised to identify the total number of oil and gas projects that may be expected to operate during a single season in each sea, the potential proximity of such operations, and the impact of multiple and/or clustered operations upon local and regional air quality.

B. Invasive Species

The draft EIS does not adequately consider the threat that oil and gas activities in the Beaufort and Chukchi seas will introduce invasive species to the Arctic marine environment. Alaska's Arctic waters are vulnerable to invasion by exotic species.⁴²³ Invasive species pose a threat because they could "compete with or prey on Arctic marine fish or shellfish species, which may disrupt the ecosystem and predators that may depend on indigenous species."⁴²⁴ Invasive species could "impact the biological structure of bottom habitat" or change habitat diversity,⁴²⁵ or "could compete with marine mammal prey, such as an invasive mollusk replacing the indigenous mollusk that walrus feed on."⁴²⁶ Other invasive species, such as rats, could prey upon seabirds or their eggs. Because "a significant portion of Alaska's economy . . . depends upon the pristine and natural quality of its aquatic ecosystems," establishment of a harmful invasive species could also threaten Alaska's economic well-being.⁴²⁷ Climate change heightens this risk, as previously unknown species may increasingly invade Arctic waters, threatening native species.⁴²⁸

Increased numbers of oil and gas activities risks introducing aquatic invasive species to the Beaufort and Chukchi seas. For example, "[i]nvasive species could be released in ballast water from ships, carried on ship hull fouling communities or brought in on drilling rigs that had been used in waters other than the Arctic."⁴²⁹ The summary conclusions contained in the draft

⁴²² See *id.* at L-14.

⁴²³ See North Pacific Fisheries Management Council, Public Review Draft, Arctic Fishery Management Plan at 93 (Jan. 2009); see also G.V. Ashton, *et al.*, *First non-native crustacean established in coastal waters of Alaska*, *Aquatic Biology* 3(2), 133-37 (2008); cf. Marcos Tavares and Gustavo A. S. De Melo, *Discovery of the first known benthic invasive species in the Southern Ocean: the North Atlantic spider crab *Hyas araneus* found in the Antarctic Peninsula*, *Antarctic Science* 16 (2), 129-31 (2004).

⁴²⁴ North Pacific Fishery Management Council, Environmental Assessment for the Arctic Fishery Management Plan at 76 (Aug. 2009) (Arctic FMP EA), available at <http://www.fakr.noaa.gov/analyses/arctic/earirfrfa0809final.pdf>; see also *id.* at 141, 150, 160, 188-189 (noting risks posed by invasive species).

⁴²⁵ *Id.* at 141.

⁴²⁶ *Id.* at 188.

⁴²⁷ MMS, Outer Continental Shelf Oil & Gas Leasing Program: 2007-2012, Final EIS, OCS EIS/EA MMS 2007-003 at IV-14 (April 2007) (2007-2012 FEIS) available at <http://www.boemre.gov/5-year/2007-2012FEIS.htm>.

⁴²⁸ See, e.g., 2007-2012 EIS at IV-10; Arctic FMP EA at 76; 130.

⁴²⁹ *Id.* at 76; see also S. Gollasch, *The importance of ship hull fouling as a vector of species introductions into the North Sea*, *Biofouling* 18(2):105-121 (2002); National Research Council, *Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water* (1996) (recognizing that the spread of invasive species through ballast water is a serious problem).

EIS provide little information by which to judge the potential adverse effects, determine appropriate mitigation measures, or choose among competing alternatives.⁴³⁰

X. FUTURE PERMITTING

A. Reliance on delayed ESA consultations

Federal agencies must ensure against the likelihood of jeopardy “in consultation with and with the assistance of the Secretary[.]”⁴³¹ The draft EIS asserts that the action agencies will engage in consultation only when specific activities are under review, i.e., at the authorization/permitting stage.⁴³² The Ninth Circuit, however, has squarely rejected the notion that ESA consultation on a programmatic overview can be substituted for later site-specific consultations.⁴³³ It has similarly held that incomplete information as to the precise location and extent of future activities does not excuse the failure to produce a comprehensive biological opinion.⁴³⁴ Consultation must take place before the release of a final EIS.

B. Authorizing oil and gas activities while the EIS remains unfinished

As our groups have repeatedly brought to NMFS’s attention, NEPA regulations make clear that agencies should not proceed with authorizations for individual projects until an ongoing programmatic EIS is complete.⁴³⁵ That limitation is relevant to the IHAs application currently before NMFS, including Shell’s plan for exploration drilling beginning in 2012. Shell’s 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 will occur in the same season and seismic surveying conducted by both BP and ION. 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.⁴³⁶

C. Authorizing oil and gas activities without a site-specific review

The draft EIS states that the final document may be used as the “sole” NEPA compliance document for future activities.⁴³⁷ Such an approach is unwarranted. The EIS, as written, does

⁴³⁰ See, e.g., DEIS at 4-71-72; 4-251; 4-288.

⁴³¹ 16 U.S.C. § 1536(a)(2).

⁴³² DEIS at 6-1.

⁴³³ *Pacific Rivers Council v. Thomas*, 30 F.3d 1050, 1054-55 (9th Cir. 1994) (finding that consultation is required even when overarching plans are “merely” programmatic documents).

⁴³⁴ *Conner*, 848 at 1453-54 (noting that the agency could have determined whether activities in particular areas were fundamentally incompatible with the continued existence of species, and could have also identified potential conflicts between species and post-leasing activities due to cumulative impact).

⁴³⁵ See 40 C.F.R. § 1506.1(c).

⁴³⁶ The EIS may also illuminate issues such as necessary mitigation measures and important time and place restrictions.

⁴³⁷ DEIS at 1-10.

not provide sufficient information about the effects of specific activities taking place in any particular location in the Arctic. The Ninth Circuit has criticized attempts to rely on a programmatic overview to justify projects when there is a lack of “any *specific* information” about cumulative effects.⁴³⁸ That specificity is missing here as well. For example, Shell’s proposed a multi-year exploration drilling program in both seas beginning in 2012 will involve ten wells, four ice management vessels, and dozens of support ships. The EIS simply does not provide an adequate analysis that captures the effects of the entire enterprise, including: 1) the *Kulluk*’s considerable disturbance zone; 2) the proximity of the drill sites to bowhead feeding locations and the number of potentially harassed whales; or 3) the total combined effects of drilling, ice management, and vessel traffic.⁴³⁹

Thank you for considering these comments, and we look forward to continuing to work together on the development of this proposal.

Sincerely,

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

Michael Mayer
Project Attorney
EARTHJUSTICE

John Kaltenstein
Marine Program Manager
FRIENDS OF THE EARTH

Michael Jasny
Senior Policy Analyst
NATURAL RESOURCES DEFENSE
COUNCIL

Pamela A. Miller
Arctic Program Director
NORTHERN ALASKA ENVIRONMENTAL
CENTER

Michael Stocker
OCEAN CONSERVATION RESEARCH

Susan Murray
Senior Director, North Pacific
OCEANA

Shawna Larson
Alaska Program Director
PACIFIC ENVIRONMENT

Dan Ritzman
Alaska Program Director
SIERRA CLUB

⁴³⁸ *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 997 (9th Cir. 2004) (emphasis in original).

⁴³⁹ See Beaufort IHA comments, attached as Exh. 4.

Nicole Whittington-Evans
Alaska Regional Director
THE WILDERNESS SOCIETY

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