

OCEAN CONSERVATION RESEARCH



Science and technology serving the sea

James H. Lecky
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National Marine Fisheries Service – NOAA
1315 East-West Highway
Silver Spring, MD 20910

February 6, 2012

Cc: Jane Lubchenko

Re: DEIS – Effects of Oil and Gas Activities in the Arctic

Dear Mr. Lecky,

We welcome the opportunity to review and comment on the Draft Environmental Impact Statement on the Effects of Oil and Gas Activities in the Arctic (hereinafter DEIS). We will attempt to be thorough and informative in our review comments, and I am grateful that the public 45 day comment period was extended in consideration of the draft being released over the traditional American winter holidays. This is particularly important because the Arctic – heretofore being a largely pristine environment is rapidly becoming an industrial Klondike and is likely to become irreversibly transformed even before citizens have a chance to review the proposed transformations.

I'm sure that the irony has been repeatedly brought to your attention that while NMFS-NOAA is drafting their five year plan for the Arctic, Shell Oil is in the midst of not one, but two tragic oil spills. One is in the temperate waters Nigeria of some 44,000 barrels, the second in the temperate waters of the Gulf of Mexico consisting of some 14,000 barrels of drilling muds (diesel fuel mixed with abrasives and other chemicals) spilled during an *exploratory* operation not unlike deep water exploratory operations proposed for the Beaufort Sea. This should be taken into serious consideration, particularly since it is stated a number of times in the DEIS that an oil spill is "highly unlikely."

The Gulf of Mexico incident is under the new safety regime established by the Bureau of Ocean Energy Management and Regulation (now Bureau of Ocean Energy Management – BOEM, and the Bureau of Safety and Environmental Enforcement – BSEE) in the wake of the largest oil spill disaster in US waters that was made possible by industrial hubris, regulatory incompetence, and lax enforcement. While we understand that the division of the Department of the Interior into BOEM and BSEE has brought many sensible changes to the management of our national resources, the occurrence of this incident reflects poorly on the implementation of that division.

We introduce our comments on the Draft EIS for Arctic oil and gas activities with this framing not because oil and gas operations in Nigeria or the Gulf of Mexico are germane to planned activities in the Arctic, but rather they point to systematic problems with the industry and regulatory oversight that will not be ameliorated as these practices head into the more physically challenging Arctic environment. And given what we are being told about operational safety and environmentally sensitive practices, in the face of the current and ongoing disasters I can only take a tepid view of the assurances that the we, the public are given about Arctic environmental safety and mitigation strategies.

We will demonstrate in our review that while some of the more obvious environmental disruptions of the proposed operations have been addressed in the EIS, there are many other noise factors in Arctic hydrocarbon exploration and extraction operations that will have environmental impacts which are poorly understood, or as yet unknown.

While the US regulatory framework required by NEPA hinges on specific impacts to certain species – either under the Marine Mammal Protection Act (MMPA) or the Endangered Species Act (ESA) and also more generally under the OCS Lands Act, we now understand that individual species do not make up the environment but rather the health of individual species is an expression of ecosystem vitality. This perspective has increasingly come into consideration under NOAA’s growing use of “Ecosystem Based Management” in the regulation and protection of Marine Protected Areas (MPAs).

MMPA, ESA, and OCS Lands Act regulatory responsibilities can be addressed by “checking the proper boxes” under review, but it is incumbent upon us to bring what we do know about the fabric of healthy ecosystems into our deliberations about any actions that will compromise the vitality of the subject ecosystem. We need to do this not only to assure the ongoing viability of the ecosystems in question, but also to assure our own viability on this increasingly challenged planet we inhabit.

1.0 Proposed reach of the DEIS

While the “need” for EIS is framed in the context of exploratory operations only, it not only presupposes the extraction of hydrocarbons from the Arctic, the EIS makes the extraction of discovered hydrocarbons inevitable by stating that “NMFS may tier from this EIS to support future Arctic MMPA oil and gas permit decisions if such activities fall outside the scope of this EIS” (DEIS Section 1.2, p1-3). In light of the existing lousy track record and the current ongoing problems with extraction operations, along with the constant introduction of new practices and technologies, we believe it is unwise to leave such an open-ended permit to move into production without proper review of the extensive processes, technologies, and infrastructure required for commercial hydrocarbon exploitation.

We suggest that the current DEIS be limited exclusively to exploration because we do understand the scope of most of the technologies proposed on Alternatives 2 through 4. Any additional complexities associated with proposed future extraction should be reviewed in their own contexts.

2.0 Scope of these comments

The DEIS specifically concerns exploration by way of surveys, mapping, and exploratory drilling. While all of these activities impose various impacts on the environment, biota, and human inhabitants of the Arctic including chemical, climatological, economic, and physical changes, we will focus our comments on acoustical impacts on sea animals (fish and marine mammals) with the understanding that others have and will address the impacts of oil spills, effluent discharge, drilling mud disposal, methane and other gas releases, physical habitat disruption, ship strikes, and the synergistic impacts of having an increase in chronic human activity in an environment that until recently was not so disposed.

2.1 Comments and review

The Arctic can be a noisy environment, particularly when the seasonal ice begins to break up. Additionally many arctic animals make their own noises, sometimes quite loud. But Arctic animals have adapted to the repertoire of naturally occurring noises by either occupying a bio-acoustic niche which is clear from masking effects of certain noises, or by avoiding areas close to high noise sources.

Industrialization of the Arctic is bringing in an entirely new repertoire of noises which are not in sync with biological adaptations, so just by the very nature and temporal-spatial context of the noises generated, industrial noises will be disruptive.¹

The acoustical impacts are a significant component to hydrocarbon exploration and include:

- impulse noise from deep penetration seismic airgun surveys
- impulse noise from site survey sparkers and airgun arrays
- periodic noise from site clearance bathymetric survey sonars
- periodic noise from on-ice vibroseis surveys
- continuous and periodic noise from drilling
- impact noise from construction/erection of exploratory drilling platforms
- continuous noise from running machinery
- continuous and chronic noise from transport and support vessels
- continuous and chronic noise from thruster-stabilized drilling platforms
- periodic noise from platform maintenance operations,
- continuous and periodic noise from AUV communications
- periodic noise from helicopter and other aircraft transport
- continuous and periodic noise from ice-breaker operations

¹ Christine Erbe and David M. Farmer, "Zones of impact around icebreakers affecting beluga whales in the Beaufort Sea." J. Acoust. Soc. Am. 108 (3), Pt. 1 p.1332

Of the noise sources identified above, the only noises substantially addressed in the DEIS are 2D/3D Seismic Surveys, In-Ice Surveys, Site Clearance and High Resolution Shallow Hazard Surveys, On-ice Seismic Surveys, and Exploratory Drilling.

We know that seismic airgun surveys are disruptive. They are known to disrupt foraging behavior at distances greater than the typical 1000 meter observation/mitigation threshold² and that Belugas are known to avoid seismic surveys at distances greater than 10 km^{3,4} and behavioral disturbance of bowheads have been observed at distances of 7km – 35km.⁵ And while observers are charged with initiating shut-down procedures when marine mammals are sited within 1km of a seismic survey operation, effecting a ‘mitigation’ the fact that marine mammals are seen in significantly lower numbers during seismic surveys indicates a broader impact on marine mammals that extends far beyond the standard 1000 meter mitigation set-back.⁶ These observations belie the “unlikely impacts” evaluation peppered throughout the DEIS regarding impacts from seismic surveys. This disruption would be the case with both impulse sounds used in penetration as well as high-resolution seismic surveys.

Fortunately we do have a sizable body of data on the impacts of seismic surveys on marine mammals and fish. And while there are a few studies that do not clearly

² Jochens, A., D. Biggs, K. Benoit-Bird, D. Engelhaupt, J. Gordon, C. Hu, N. Jaquet, M. Johnson, R. Leben, B. Mate, P. Miller, J. Ortega-Ortiz, A. Thode, P. Tyack, and B. Würsig. 2008. Sperm whale seismic study in the Gulf of Mexico: Synthesis report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-006. 341 pp. SWSS final report was centered on the apparent lack of large-scale effects of airguns (distribution of sperm whales on scales of 5-100km were no different when airguns were active than when they were silent), but a key observation was that one D-tagged whale exposed to sound levels of 164dB re:1µPa ceased feeding and remained at the surface for the entire four hours that the survey vessel was nearby, then dove to feed as soon as the airguns were turned off.

³ Miller, G.W., R.E. Elliott, W.R. Koski, V.D. Moulton, and W.J. Richardson. 1999. Whales. p. 5-1 – 5-109 In W.J. Richardson, (ed.), Marine mammal and acoustical monitoring of Western Geophysical's open-water seismic program in the Alaskan Beaufort Sea, 1998. LGL Report TA2230-3. Prepared by LGL Ltd., King City, ONT, and Greeneridge Sciences Inc., Santa Barbara, CA, for Western Geophysical, Houston, TX, and NMFS, Anchorage, AK, and Silver Spring, MD. 390 p.

⁴ Harris, R.E., T. Elliot, and R.A. Davis. 2007. Results of mitigation and monitoring program, Beaufort Span 2-D marine seismic program, open-water season 2006. LGL Rep. TA4319-1. Rep. from LGL Ltd., King City, Ont., for GX Technology Corp., Houston, TX. 48 p.

⁵ Richardson, W.J., Greene Jr, C.R., Malme, C.I. and Thomson, D.H. 1995. Marine Mammals and Noise. Academic Press, San Diego. 576pp.

⁶ Holst, M., M.A. Smultea, W.R. Koski, and B. Haley. 2005. Marine mammal and sea turtle monitoring during Lamont-Doherty Earth Observatory's marine seismic program off the Northern Yucatán Peninsula in the Southern Gulf of Mexico, January–February 2005. LGL Report TA2822-31. Prepared by LGL Ltd. environmental research associates, King City, ONT, for Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY, and NMFS, Silver Spring, MD. June. 96 p.

demonstrate impacts, there are many other examples where compromises to fisheries,⁷ damage to squid,⁸ and disruptions to marine mammals⁹ due to seismic airgun surveys are unambiguous. The studied impacts – along with the many anecdotal accounts point to the likelihood that impacts may vary depending on circumstances and conditions and should not be dismissed just because of a few studies that indicate only “negligible impacts.”

Additionally the DEIS states that “Research on acoustic impacts to fish has been limited to relatively few species, and specific data regarding the effects of noise on the species encountered in the arctic environment are lacking” but then without substantiation states “enough information exists to perform a full analysis.”¹⁰

We don’t believe that this is the case, as we know next to nothing about Arctic fish and invertebrate acoustical adaptations to an environment that is completely dark for a large part of the year. Given what we do know about animal adaptations to extreme environments¹¹ we can assume that there is a complex range of adaptations that are yet unknown to science. This assumption is safer and more biologically accurate than the blanket assumption made in the DEIS that “fish are unlikely to remain in an area where intense sounds sources are present long enough to be injured or killed.”¹²

While migratory fish may evade threats by swimming away, many fish, especially sedentary fish, will “entrench” into their safe zone when threatened, and thus prolong their exposure to potentially damaging stimulus. An example of “entrenchment” behavior is found in Knudsen 1994 with salmon exposed to 5 – 10 Hz noise. These animals retreated to deeper waters, even while the deeper water they retreated into was closer to the sound source.¹³ Assuming that fish will “move out of harm’s way” is an irresponsible management assumption and needs to be verified prior to stating that “enough information exists to perform a full analysis.”

⁷ Arill Engås, Svein Løkkeborg, Egil Ona, and Aud Vold Soldal “Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*)” *Can. J. Fish. Aquat. Sci.* 53: 2238–2249 (1996).

⁸ Michel André, Marta Solé, Marc Lenoir, Mercè Durfort, Carme Quero, Alex Mas, Antoni Lombarte, Mike van der Schaar, Manel López-Bejar, Maria Morell, Serge Zaugg, and Ludwig Houégnigan “Low-frequency sounds induce acoustic trauma in cephalopods” *Frontiers in Ecology and the Environment*. Nov. 2011 V9 Iss.9

⁹ Richardson WJ, Miller GW, Greene Jr. CR 1999. “Displacement of Migrating Bowhead Whales by Sounds from Seismic Surveys in Shallow Waters of the Beaufort Sea.” *J. of Acoust. Soc. of America*. 106:2281.

¹⁰ DEIS Section 4.55.2.2 p. 4 -73

¹¹ Michael Tobler, Ingo Schlupp, Katja U. Heubel, Rüdiger Riesch, Francisco J. García de León, Olav Giere and Martin Plath. “Life on the edge: hydrogen sulfide and the fish communities of a Mexican cave and surrounding waters” 2006 *Extremophiles Journal*, Volume 10, Number 6, Pages 577-585

¹² DEIS Section 4.55.2.2 p. 4 -74

¹³ Knudsen, F.R., P.S. Enger, and O. Sand. 1994. Avoidance responses to low frequency sound in downstream migrating Atlantic salmon smolt, *Salmo salar*. *Journal of Fish Biology* 45:227–233.

Noises from the erection of drilling platforms have not been evaluated in the DEIS although it is likely that these will be used in the Chukchi Sea and will likely occur in the spring and summer when impacts on breeding marine mammals would be the highest. To date installation and erection noises from “jack-up” drilling platforms have not been evaluated in peer reviewed literature and will need to be evaluated prior to authorizing the use of this technology under this EIS. The DEIS states that “it is assumed that the first time a jack-up rig is in operation in the Arctic, detailed measurements will be conducted to determine the acoustic characteristics.”¹⁴ This statement implies an “assumption” that the noise levels found on erecting the jack-up rig will be below levels required for mitigation. What would be the procedure if the noise exposure threshold was exceeded? We suggest that the noises of erecting a jack-up rig be characterized in a trial basin before deployment to a remote location where the environment is more sensitive to disruption and where the phrase “practicable mitigation” takes on a more relaxed meaning.

Noises from floating drilling platforms were evaluated in the DEIS in Section 2.3.3.4, but all three platforms evaluated were moored (two drill ships and one floating platform) and the measured noise was produced by drilling operations only. It is likely that deep-water drilling in the Beaufort Sea will include thruster-stabilized platforms (mentioned in the same section). These are dynamic positioning systems that continuously drive six to eight large propellers on a drillship or semi-submersible drilling platform. All of these propellers will be cavitating and creating turbulence 24 hours a day. This constitutes continuous noise and will need to be quieter than 120 dB re: 1 μ Pa in order to be below NMFS disturbance criteria for continuous noise exposure.

To date noise from thruster-stabilized drilling platforms has not been evaluated in peer reviewed literature and will need to be evaluated prior to authorizing the use of this technology under this EIS.

Due to the challenging physical environment in the Arctic all exploratory drilling operations will have a higher number of operating vessels in and around each project which will include crew change vessels, ice management vessels, oil spill response vessels, and fuel barges (see Table 2.2 “Summary of Typical Support Operations for Exploration Activities” in the DEIS). While each individual vessel is considered a single, periodic or transient source of noise, the entire operation requiring multiple vessels needs to be considered in whole as a source of continuous noise because the operation would not occur without the full complement of vessels. As such the entire operation around a drilling ship or drilling platform will need to be quieter than 120 dB re: 1 μ Pa in order to be below NMFS disturbance criteria for continuous noise exposure.

Increasingly tasks in ocean industries are being delegated to remotely operated and autonomous unmanned vessels. This will particularly be the case in any proposed Arctic operations where human exposure to the elements is costly and dangerous. Many of these technologies rely on acoustical communication systems. These systems operate in a number of different frequency regimes depending on the application. The communication bands include mid-frequency (up to 10kHz) for navigation, upper mid-frequency (20kHz-

¹⁴ DEIS Section 2.3.3.4, final sentence, p 2-18

60kHz) for task management and coordination on multi-nodal networks, and high frequency (above 100 kHz) for transmission of video and profiling data.

While mid-frequency military sonar has been associated with catastrophic strandings of marine mammals,¹⁵ to date none of the mid-frequency or upper-mid frequency industrial communication sonars have been evaluated for their impacts on marine mammals. And with the exception of the “cautionary” suggestion in the first paragraph of page 4-95 of the DEIS¹⁶ the potential impacts of the increased use of industrial communication sonars is not included in the DEIS. We suggest that this “warranted caution” be developed into a directive to understand the impacts of these new and introduced communication technologies on Arctic odontocetes and pinnepeds prior to their extensive deployment in the Arctic under this DEIS.

The noisiest period of the fossil fuels industrial activities is during exploration and establishment of sites.¹⁷ This noise is due to surveys and placement of equipment, but it is also due to the high concentration of support vessels and aircraft used in the dynamics of exploration. Aircraft noise will be louder because aircraft will be carrying and placing heavy equipment, not just personnel associated with operations. Helicopters will more likely be larger work craft such as the Bell UH-1 “Huey” or the twin rotor “Chinook.” Gray whales are known to avoid low flying aircraft,¹⁸ and execute abrupt turns and dives to avoid small, low flying helicopters;¹⁹ larger helicopters under load will produce greater impacts.

Concerns for aircraft impacts are mentioned in the DEIS section 3.3.7.3, but predominantly about the impacts on subsistence hunters. The stated impacts are due to aircraft frightening the hunter’s quarry, so by inference the increase in aircraft numbers as well as their heavier payloads will have impacts on wild animals including whales (not hauled out pinnepeds and polar bears). Unless helicopters and other heavy load aircraft are grounded during the spring and summer months, there is a high probability that they will disrupt or “take” marine mammals in the water. This is not adequately addressed in the DEIS (Section 4.5.2.4.5).

¹⁵ Balcomb III, KC, Claridge DE. 2001. A mass stranding of cetaceans caused by naval sonar in the Bahamas. *Bahamas J. Sci.* 8(2):2-12.

¹⁶ “However, evidence that sonar signals can, in special circumstances, lead (at least indirectly) to physical damage and mortality ... suggests that caution is warranted when dealing with exposure of marine mammals to any high-intensity “pulsed” sound.”

¹⁷ Richardson, W.J., Greene Jr, C.R., Malme, C.I. and Thomson, D.H. 1995. *Marine Mammals and Noise*. Academic Press, San Diego. 576pp.

¹⁸ Ljungblad, D.K., Moore, S.E. and Van Schoik, D.R. 1983. Aerial surveys of endangered whales in the Beaufort, eastern Chukchi and northern Bering Seas, 1982. NOSC Technical Document 605 to the US Minerals Management Service, Anchorage, AK. NTIS AD-A134 772/3. 382pp

¹⁹ Southwest Research Associates. 1988. Results of the 1986-1987 gray whale migration and landing craft, air cushion interaction study program. USN Contract No. PO N62474-86-M-0942. Final Report to Nav. Fac. Eng. Comm., San Bruno, CA. Southwest Research Associates, Cardiff by the Sea, CA. 31pp.

3.0 Summary

Permitting hydrocarbon exploration in the Arctic Ocean presupposes extraction, and as such the actions proposed under this DEIS are “the camel’s nose under the tent” that will inevitably lead to large-scale disruption of a pristine habitat that is already under significant stress. The implications of this disruption are global in scale – from the contributions of CO₂, methane, and other greenhouse gasses to the environment, the climatological implications of polar ice melt-back, the disruptions to commercial fisheries, and to disruptions to indigenous lifeways.

These impacts are implied in the proposed actions alone, without considering the reasonable probability of accidental release of oil or gas into the environment. And while it is not in the purview of the DEIS to qualify Incidental Harassment Authorization applicants on their performance record, the ongoing poor safety and environmental compliance performance of various members of the fossil fuel industry brings into question many of the operating assumptions upon which the DEIS is based.

We have found that while the DEIS does address many concerns, the following acoustical impacts have not been adequately addressed:

- Mitigation distances and thresholds for seismic surveys fall far short of where significant marine mammal disturbances are known to occur.
- Propagation of airgun noise from in-ice seismic surveys is not accurately known, complicating mitigation threshold distances and procedures.
- Impacts of seismic airgun surveys on Arctic fish and essential fish habitat is known to be negative, is poorly understood, and is not thoroughly presented in the DEIS.
- Impacts of seismic airgun surveys on squid and other invertebrates have not been included in the DEIS and need to be considered both in terms of the particular species as well as in terms of their role in the food supplies of marine mammals and commercial and protected fish.
- Noise from the erection and deployment of Jack-up rigs and other stationary platforms need to be quantified and qualified prior to introducing them into the Arctic.
- Noise from thruster-driven dynamic positioning systems on drilling platforms and drill ships need to be quantified and qualified prior to introducing them into the Arctic.
- Aggregate noise from any operation with multiple support vessels needs to be considered a “continuous noise source” and comply with the NMFS 120dB re: 1µPa marine mammal disturbance threshold.
- Noise impacts on marine mammals from underwater acoustic communication systems needs to be evaluated and incorporated into the DEIS.
- Noise impacts of heavy transport aircraft and helicopters needs to be evaluated and incorporated into the DEIS

The foregoing “punch-list” accounts for individual actions, aggravators, or impacts. But all of these activities will be occurring throughout the permissible seasons, each and

every action taking some toll on the entire environment. While impacts reviewed (and those not reviewed) in this DEIS will occur on “estimated numbers” of protected animals, these animals live in an ecosystem where the synergistic impacts of individual or specific stressors are difficult to trace or calculate.

It is clear that the intention of the exploration actions in the DEIS are not to “just find out what is out there,” but rather to find out where extraction operations will yield the best results. As such this DEIS is the gateway to rapid expansion of hydrocarbon extraction in the Arctic, the impacts of which will make the proposed action impacts in the DEIS pale.

Time and time again, by way of systematic justifications of some environmental compromise or other we have been eroding the environmental health of the very habitat that we depend on for our own life support. This is evidenced by the continuous acceleration of species extinctions world-wide. This trend points to the fact that soon enough humans will find ourselves near the top of the “endangered” list – unless we begin to make broad systematic changes in the way we engage with our limited planetary habitat.

We feel that when our recommendations are included in the DEIS, that they will clearly point to habitat and species compromise for which there are no mitigations and no recovery.

Due to all of the foregoing we recommend that the “No action alternative” be selected.

Sincerely,

A handwritten signature in black ink that reads "Michael Stocker". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Michael Stocker
Director
Ocean Conservation Research