



EARTHJUSTICE

BOZEMAN, MONTANA DENVER, COLORADO HONOLULU, HAWAII
INTERNATIONAL JUNEAU, ALASKA OAKLAND, CALIFORNIA
SEATTLE, WASHINGTON TALLAHASSEE, FLORIDA WASHINGTON, D.C.

July 31, 2007

Submitted electronically to pr1.alaskaeis@noaa.gov

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

**Re: Attached Corrected Comments on the Draft Programmatic EIS Seismic
Surveys in the Beaufort and Chukchi Seas**

Dear Mr. Payne:

Due to a clerical error, the comments submitted to you yesterday on the Draft Programmatic Environmental Impact Statement for Seismic Surveys in the Beaufort and Chukchi Seas (draft PEIS) on behalf of Alaska Wilderness League, Center for Biological Diversity, Earthjustice, Native Village of Point Hope, Natural Resources Defense Council, Northern Alaska Environmental Center, Pacific Environment, Sierra Club, The Wilderness Society, and their members in Alaska and nationwide, mistakenly referred to the Native Village of Point Hope as the Native Village of Hope. Please replace yesterday's comment letter with the attached version, which corrects this error.

Thank you for your assistance.

Sincerely yours,

Deirdre McDonnell
Staff Attorney

attachment



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**ALASKA WILDERNESS LEAGUE, CENTER FOR BIOLOGICAL DIVERSITY,
EARTHJUSTICE, NATIVE VILLAGE OF POINT HOPE, NATURAL RESOURCES
DEFENSE COUNCIL, NORTHERN ALASKA ENVIRONMENTAL CENTER,
PACIFIC ENVIRONMENT, SIERRA CLUB, and THE WILDERNESS SOCIETY**

Corrected Version

July 30, 2007

Submitted electronically to pr1.alaskaeis@noaa.gov

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

**Re: Comments on the Draft Programmatic EIS Seismic Surveys in the Beaufort
and Chukchi Seas**

Dear Mr. Payne:

Thank you for this opportunity to comment on the Draft Programmatic Environmental Impact Statement for Seismic Surveys in the Beaufort and Chukchi Seas (draft PEIS). These comments are submitted on behalf of Alaska Wilderness League, Center for Biological Diversity, Earthjustice, Native Village of Point Hope, Natural Resources Defense Council, Northern Alaska Environmental Center, Pacific Environment, Sierra Club, The Wilderness Society, and their members in Alaska and nationwide.

We are seriously concerned about the risks posed to sensitive marine and coastal environments from the proposed oil and gas activities in the Chukchi and Beaufort Seas. We wish to express our opposition to the proposed seismic program because it poses unnecessary risks to the unique wildlife of the Arctic Ocean and interferes with Native residents' right to practice their traditional subsistence activities. While we support your decision to prepare an EIS, instead of proceeding on the basis of an environmental assessment (EA) as was done last year, we are concerned that the main difference between last year's document and this year's, may be in the title rather than the substance. In various points throughout the document, the EIS refers to itself as the "PEA." *See, e.g.*, DPEIS at III-17. We are concerned that the document fails to present a thorough review as required by NEPA, but rather is a rehash of old analyses.

There has been a greatly accelerated pace of oil leasing, exploration, and development across the Arctic—both onshore and offshore. The piecemeal approval of these activities

threatens important resources and leads to an underestimate of the cumulative impacts of the industrialization of the Arctic.

The Minerals Management Service (MMS) has failed to address adequately the many significant issues raised in our previous comments on the Multi-Sale Final Environmental Impact Statement (Multi-Sale FEIS) for Lease Sales 186, 195 and 202, the environmental assessments for these sales, the programmatic environmental assessment for seismic testing (DPEIS), and our comments on FWS's and NMFS's incidental harassment authorization and incidental take regulations for Beaufort Sea polar bear and walrus. We reiterate those comments here.

I. BACKGROUND

A. Impacts of seismic survey noise to marine life

The oil and gas industry typically relies for offshore exploration on airguns, submersible devices that are towed behind boats singly or in long arrays, firing shots of compressed air into the water about every ten seconds.¹ A large seismic array can produce effective peak pressures of sound that are higher than those of virtually any other man-made source save explosives – over 250 decibels.² If the seafloor is hard and acoustically reflective, the noise might be heard for many hundreds of miles; under the right conditions, it can reverberate in such a way as to sound nearly continuous, masking the calls of baleen whales and other animals that rely on the acoustic environment for breeding and survival.³

A substantial body of evidence demonstrates that airgun pulses and other forms of intense ocean noise can have a wide range of impacts on marine animals, including marine mammals, fish, and invertebrates such as squid.

1. Impacts to marine mammals

Many marine mammals depend on sound to navigate, find food, locate mates, avoid predators, and communicate with each other. Flooding their habitat with man-made, high-intensity noise interferes with these and other functions. As marine science and the courts have increasingly recognized, intense underwater sound can have a range of deleterious effects on marine mammals and other ocean life. *See, e.g., National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722 (9th Cir. 2001); *NRDC v. Evans*, 279 F.Supp.2d 1129 (N.D. Cal. 2003); International Whaling Commission, Report of the Scientific Committee to the International Whaling Commission, at § 12.2.5 and Annex K (2004) (concluding that there is “now

¹ The airgun, which replaced dynamite as the industry's primary method of underwater exploration, is not the only technology used today. Other methods, which also produce impulsive noise above 200 decibels (dB), include sleeve exploders, gas guns, sparkers, and boomers. In addition, survey vessels frequently employ multi-beam and sub-bottom profiling sonars whose source levels run as high as 230 dB (RMS) or more. W.J. Richardson, C.R. Greene, Jr., C.I. Malme, and D.H. Thomson, *Marine Mammals and Noise* 136-47 (1995).

² Except where noted, all decibel levels cited herein represent the peak pressure of the sound source, calculated in reference to one microPascal-meter (re 1 μ Pa-m), at one meter's distance.

³ See, e.g., International Whaling Commission, 2004 Report of the Scientific Committee: Annex K (2004).

compelling evidence implicating anthropogenic sound as a potential threat to marine mammals” at both the “regional and ocean scale levels.”)

The harmful effects of high-intensity human-made noise include:

- strandings and other non-auditory physical injuries;
- temporary or permanent loss of hearing, which impairs an animal’s ability to communicate, avoid predators, and detect and capture prey;
- avoidance behavior, which can lead to abandonment of habitat or migratory pathways;
- disruption of biologically important behaviors such as mating, feeding, nursing, or migration, or loss of efficiency in conducting those behaviors;
- aggressive (or agonistic) behavior, which can result in injury;
- masking of biologically meaningful sounds, such as the call of predators or potential mates;
- chronic stress, which can compromise viability, suppress the immune system, and lower the rate of reproduction;
- habituation, causing animals to remain near damaging levels of sound, or sensitization, exacerbating other behavioral effects; and
- declines in the availability and viability of prey species, such as fish and shrimp.⁴

Seismic surveys, in particular, can seriously harm whales and other marine mammals. Impacts range from tissue hemorrhaging and strandings, to temporary and permanent hearing loss, to abandonment of habitat and disruption of vital behaviors like mating and feeding.

In 2002, for example, two beaked whales (*Ziphius cavirostris*) were found to have stranded in the Gulf of California, Mexico, coincident with geophysical surveys that were being conducted in the area.⁵ That same year, endangered adult humpback whales were reported to have stranded in unusually high numbers along Brazil’s Abrolhos Banks, where oil-and-gas

⁴ For a review of research on behavioral and auditory impacts of undersea noise, see, e.g., W. John Richardson et al., Marine Mammals and Noise (1995); Jonathan Gordon & Anna Moscrop, “Underwater Noise Pollution and Its Significance for Whales and Dolphins,” in The Conservation of Whales and Dolphins (M.P. Simmons & J.D. Hutchinson eds., 1996); National Research Council, “Ocean Noise and Marine Mammals” (2003); P. Tyack, “Behavioral Impacts of Sound on Marine Mammals,” Presentation to the U.S. Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals (February 4, 2004); Whale and Dolphin Conservation Society, “Oceans of Noise” (2004). For two papers on strandings of whales associated specifically with seismic exploration, see M.H. Engel, M.C.C. Marcondes, C.C.A. Martins, F. O Luna, R.P. Lima, and A. Campos, “Are Seismic Surveys Responsible for Cetacean Strandings? An Unusual Mortality of Adult Humpback Whales in Abrolhos Bank, Northeastern Coast of Brazil,” IWC Doc. SC/56/E28 (2004); J. Hildebrand, “Impacts of Anthropogenic Sound on Cetaceans,” IWC Doc. SC/56/E13 (2004) (includes discussion of a stranding of Cuvier’s beaked whales in the Gulf of California in September 2002).

⁵ Hildebrand, J., “Impacts of anthropogenic sound on cetaceans,” Paper submitted to the IWC Scientific Committee (2004) (SC/56/E13).

surveys were being conducted.⁶ Studies suggest that critically endangered western Pacific gray whales were displaced from important feeding grounds and exhibited behavioral changes in response to seismic surveys off Russia's Sakhalin Island.⁷ Other marine mammal species known to be affected by airgun arrays include sperm whales, whose distribution in the northern Gulf of Mexico has been observed to change in response to seismic operations; bowhead whales, which have been seen to avoid survey vessels to a distance of more than thirty-five miles while migrating off the Alaskan coast; and harbor porpoises, which have been seen to engage in dramatic avoidance responses.⁸

Based on this and other evidence, a consensus has emerged in the international scientific community that ocean noise, including noise from seismic surveys, presents a problem of significant and growing concern for marine mammals and other marine life. In 2004, for example, a working group of the International Whaling Commission ("IWC")'s Scientific Committee, representing over 100 of the world's leading marine biologists, reached a "unanimous" conclusion about the state of the science: that there "was now compelling evidence implicating anthropogenic sound as a potential threat to marine mammals, [a threat that is] manifested at both regional and ocean-scale levels that could impact populations of animals."⁹ The Scientific Committee went on to identify increases in seismic noise as "cause for serious concern" and to recommend scheduling seismic surveys to be out-of-phase with large whales, or, if conducted in critical whale habitat, to employ "strict monitoring and mitigation."¹⁰ As one sign of its continued concern about impacts to whales from seismic survey noise, this year the Scientific Committee is dedicating a symposium to the topic, with one focus of the meeting on mitigation measures to lessen these impacts.

2. Impacts to fish

Though the architecture of their ears may differ, fish are equipped, like all vertebrates, with thousands of sensory hair cells that vibrate with sound; and a number of specialized organs,

⁶ Engel, M.H., M.C.C. Marcondes, C.C.A. Martins, F. O Luna, R.P. Lima, and A. Campos, "Are seismic surveys responsible for cetacean strandings? An unusual mortality of adult humpback whales in Abrolhos Bank, Northeastern coast of Brazil," Paper submitted to the IWC Scientific Committee (2004) (SC/56/E28).

⁷ See Würsig, B., D.W. Weller, A.M. Burdin, S.A. Blokhin, S.H. Reeve, A.L. Bradford, R.L. Brownell, Jr., "Gray whales summering off Sakhalin Island, Far East Russia: July-October 1997, A joint U.S.-Russian scientific investigation," Final contact report to Sakhalin Energy Investment Company (1999); Weller, D.W., A.M. Burdin, B. Würsig, B.L. Taylor, and R.L. Brownell, Jr., "The western Pacific gray whale: A review of past exploitation, current status and potential threats," *J. Cetacean Res. Manage.* 4 (2002): pp. 7-12.

⁸ See, e.g., Mate, B.R., K.M. Stafford, and D.K. Ljungblad, "A change in sperm whale (*Physeter macrocephalus*) distribution correlated to seismic surveys in the Gulf of Mexico," *J. Acoustical Soc. Am.* 96 (1994): pp. 3268-69 (sperm whales); PEA at 127 and MMS's Beaufort Sea Lease Sale 195 (and 186), stipulation No. 4 (acknowledging that "experiences relayed by subsistence hunters indicate that, depending on the type of operations, some whales demonstrate avoidance behavior at distances of up to 35 miles") (bowhead whales); Malme et al., "Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior," (1983) (BBN Rep 5366) (gray whales); pers. comm. with Dr. David Bain, U. Washington (Nov. 10, 2003) (harbor porpoises).

⁹ International Whaling Commission, 2004 Report of the Scientific Committee at Annex K, § 6.4.

¹⁰ *Id.* at §§ 12.2.5.1, 12.2.5.2.

like the abdominal sac, called a “swim bladder,” that some species possess can boost hearing and a “lateral line” of sensory and hair cells that run the length of their bodies. Fish use sound in many of the ways that marine mammals do: to communicate, defend territory, avoid predators, and, in some cases, locate prey.¹¹

One series of recent studies showed that fish sustained extensive damage to the hair cells located at the sensory epithelia of the inner ear after they were exposed to impulsive air gun noise.¹² The damage, described as “blebbing” and “blistering” on the surface of the epithelia, “suggest that hair cells had been ‘ripped’ from the epithelia (immediate mechanical damage) or, alternatively, had ‘exploded’ after exposure (physiological damage).”¹³ In the context of the draft PEIS, this study is particularly significant because the inner ear of species examined (pink snapper) “is typical” of a number of important fish species found in the Beaufort and Chukchi seas, including salmon, cod, and haddock.¹⁴ Fish, unlike mammals, are thought to regenerate hair cells, but the pink snapper in those studies did not appear to recover within approximately two months after exposure, leading researchers to conclude that the damage was permanent.¹⁵ As researchers have consistently acknowledged, even a short-term loss in hearing can (let alone the virtually permanent damage seen in snapper) will substantially diminish its chance of survival: “[f]ishes with impaired hearing would have reduced fitness, potentially leaving them vulnerable to predators, possibly unable to locate prey, sense their acoustic environment, or, in the case of vocal fishes, unable to communicate acoustically.”¹⁶

As with marine mammals, sound has also been shown to induce temporary hearing loss in fish. Even at fairly moderate levels, for example, noise from outboard motor engines is capable of temporarily deafening some species of fish, and other sounds have been shown to affect the short-term hearing of a number of other species, including sunfish and tilapia.¹⁷

Nor is hearing loss the only effect that ocean noise can have on fish. Numerous studies, for example, have noted that fish display marked “alarm” responses to airguns and other forms of

¹¹ See, e.g., A.N. Popper, Effects of Anthropogenic Sounds on Fishes, 28(10) *Fisheries* 26-27 (2003); M.C. Hastings & A.N. Popper, Effects of Sound on Fish 19 (2005) (Report to the California Department of Transportation, Contract No. 43A0139); D.A. Croll, Marine Vertebrates and Low Frequency Sound—Technical Report for LFA EIS 1-90 (1999).

¹² McCauley et al., High Intensity Anthropogenic Sound Damages Fish Ears, *J. Acoust. Soc. Am.* 113 (Jan. 2003).

¹³ Id. at 640.

¹⁴ Id. at 641

¹⁵ Id. (some fish in the experimental group sacrificed and examined 58 days after exposure).

¹⁶ See McCauley et al., High Intensity Anthropogenic Sound Damages Fish Ears, at 641; Popper, Effects of Anthropogenic Sounds at 29.

¹⁷ A.R. Scholik and H.Y. Yan, Effects of Boat Engine Noise on the Auditory Sensitivity of the Fathead Minnow, *Pimephales promelas*, 63 *Environmental Biology of Fishes* 203-09 (2002); A.R. Scholik and H.Y. Yan, The Effects of Noise on the Auditory Sensitivity of the Bluegill Sunfish, *Lepomis macrochirus*, 133 *Comparative Biochemistry and Physiology Part A* at 43-52 (2002); M.E. Smith, A.S. Kane, & A.N. Popper, Noise-Induced Stress Response and Hearing Loss in Goldfish (*Carassius auratus*), 207 *Journal of Experimental Biology* 427-35 (2003); Popper, Effects of Anthropogenic Sounds at 28.

anthropogenic noise.¹⁸ And for years fishermen in various parts of the world have complained about declines in their catch after intense acoustic activities moved into the area, suggesting that noise is seriously altering the behavior of some commercial species.¹⁹ A group of Norwegian scientists attempted to document these declines in a Barents Sea fishery and found that catch rates of haddock and cod (the latter known for its particular sensitivity to low-frequency sound) plummeted in the vicinity of an airgun survey across a 1600-square-mile area, an area larger than the state of Rhode Island. In another experiment, catch rates of rockfish were similarly shown to decline.²⁰ Drops in catch rates in these experiments range from 40 to 80 percent.²¹

As the draft PEIS acknowledges, the potential for airguns to cause significant behavioral changes in fish and fish stocks is particularly acute when multiple sources are proposed. In such cases “concurrent surveys may facilitate the stranding of some schooling or aggregated arctic fishes onto coastal or insular beaches.” DPEIS at III-50.

Equally troubling are the high mortalities from noise exposure seen in developmental stages of fish. A number of studies, including one on non-impulsive noise, show that intense sound can kill eggs, larvae, and fry outright or retard their growth in ways that may hinder their survival later.²² Increased mortality for fish eggs has been shown to occur at distances of 5 meters from an airgun source; mortality rates approaching 50 percent affected yolk sac larvae at distances of 2 to 3 meters.²³ Also, larvae in at least some species are known to use sound in

¹⁸ See F.R. Knudsen, et al., Awareness reactions and avoidance responses to sound in juvenile Atlantic salmon, *salmo salar L.*, *Journal of Fish Biology* (1992) **40**, 523-534; Robert D. McCauley, et al. Marine Mammal Seismic Surveys: Analysis and Propagation of Air-Gun Signals; and Effects of Air-Gun Exposure on Humpback Whales, Sea Turtles, Fishes and Squid, Curtin University, Centre for Marine Science and Technology (August 1999); C.S. Wardle, et al., Effects of seismic air guns on marine fish, *Continental Shelf Research* **21**, 1005-1027 (2001).

¹⁹ See “‘Noisy’ Royal Navy Sonar Blamed for Falling Catches,” Western Morning News, Apr. 22, 2002 (sonar off the U.K.); Percy J. Hayne, President of Gulf Nova Scotia Fleet Planning Board, “Coexistence of the Fishery & Petroleum Industries,” www.elements.nb.ca/theme/fuels/percy/hayne.htm (accessed May 15, 2005) (airguns off Cape Breton); R.D. McCauley, J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe, Marine Seismic Surveys: Analysis and Propagation of Air-Gun Signals, and Effects of Air-Gun Exposure on Humpback Whales, Sea Turtles, Fishes, and Squid 185 (2000) (airguns in general).

²⁰ See A. Engås, S. Løkkeborg, E. Ona, and A.V. Soldal, Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (*Gadus morhua*) and Haddock (*Melanogrammus aeglefinus*), 53 *Canadian Journal of Fisheries and Aquatic Sciences* 2238-49 (1996); J.R. Skalski, W.H. Pearson, and C.I. Malme, Effects of Sound from a Geophysical Survey Device on Catch-Per-Unit-Effort in a Hook-and-Line Fishery for Rockfish (*Sebastes spp.*), 49 *Canadian Journal of Fisheries and Aquatic Sciences* 1357-65 (1992). See also S. Løkkeborg and A.V. Soldal, The Influence of Seismic Exploration with Airguns on Cod (*Gadus morhua*) Behaviour and Catch Rates, 196 *ICES Marine Science Symposium* 62-67 (1993).

²¹ Id.

²² See, e.g., C. Booman, J. Dalen, H. Leivestad, A. Levsen, T. van der Meer, and K. Toklum, Effector av luftkanonskyting på egg, larver og yngel (Effects from Airgun Shooting on Eggs, Larvae, and Fry), 3 *Fisken og Havet* 1-83 (1996) (Norwegian with English summary); J. Dalen and G.M. Knutsen, Scaring Effects on Fish and Harmful Effects on Eggs, Larvae and Fry by Offshore Seismic Explorations, in H.M. Merklinger, *Progress in Underwater Acoustics* 93-102 (1987); A. Banner and M. Hyatt, Effects of Noise on Eggs and Larvae of Two Estuarine Fishes, 1 *Transactions of the American Fisheries Society* 134-36 (1973); L.P. Kostyuchenko, Effect of Elastic Waves Generated in Marine Seismic Prospecting on Fish Eggs on the Black Sea, 9 *Hydrobiology Journal* 45-48 (1973).

²³ Booman et al., Effector av luftkanonskyting på egg, larver og yngel at 1-83.

selecting and orienting toward settlement sites.²⁴ Acoustic disruption at that stage of development could have significant consequences on affected species.²⁵

3. Impacts to other species

Many species in addition to mammals and fish are potentially impacted by the use of air gun arrays in seismic survey operations. It has recently been observed that many species of invertebrates possess mechanosensors that bear resemblance to vertebrate ears, making it “important to examine the effect of anthropogenic sounds on a wider range of marine fauna.”²⁶

Indeed, scientists have recorded two strandings of multiple giant squid on the Spanish coast, in both cases coinciding with nearby seismic airgun operations. During the first event, five giant squid washed up dead on Spanish beaches shortly after two seismic survey vessels conducted operations in the area. Two years later, four additional strandings were recorded under similar circumstances. The dead squid all were found with lesions on their skin and damaged internal organs.²⁷ Other species of squid have been shown to exhibit a strong startle response to air guns signals and, based on that response, it is thought that seismic surveys may significantly alter squid behavior up to 2-5 kilometers away.²⁸ Captive brown shrimp raised in a noisy environment showed reduced growth and reproduction rates as well as an increased rate of aggression (cannibalism).²⁹ And some preliminary research from Canada suggests that snow crabs exposed to seismic surveys may show increased incidence of liver and ovary damage.³⁰

II. NEPA

A. Important Data Are Missing and Important Factors Are Not Analyzed

1. *The EIS’s analysis of impacts is inadequate because it is not based on adequate baseline data and relies on out of date information.*

The draft PEIS cannot provide an adequate analysis of the impacts of seismic activities in the Arctic Ocean because there is a lack of baseline information on many species. Moreover,

²⁴ S.D. Simpson, M. Meekan, J. Montgomery, R. McCauley, R., and A. Jeffs, Homeward Sound, 308 Science 221 (2005).

²⁵ Popper, Effects of Anthropogenic Sounds at 27.

²⁶ Popper, Effects of Anthropogenic Sounds at 30.

²⁷ See Angel Guerra, Institute for Marine Investigations, Vigo, Spain, Presentation to the Annual Science Conference of the International Council for the Exploration of the Sea (2004); Debora MacKenzie, “Seismic Surveys May Kill Giant Squid,” *New Scientist* (September, 2004) (available at <http://www.newscientist.com/article.ns?id=dn6437>).

²⁸ Robert D. McCauley, *et al.*, Marine Mammal Seismic Surveys: Analysis and Propagation of Air-Gun Signals; and Effects of Air-Gun Exposure on Humpback Whales, Sea Turtles, Fishes and Squid, Curtin University, Centre for Marine Science and Technology (August 2000).

²⁹ J.P. Lagardère, “Effect of Noise on Growth and Reproduction of *Cragon cragon* in Rearing Tanks,” *Marine Biology* **71** 177-185 (1982).

³⁰ Department of Fisheries and Oceans, Canadian Science Advisory Secretariat, Potential Impacts of Seismic Energy on Snow Crab, (September 2004).

much of the data that is available is dated. MMS and NMFS need to update their information before making decisions regarding the fragile resources of the Arctic. This is especially true if the agencies intend to rely on an “adaptive management approach.”

There are no reliable estimates of the stocks of ringed seals, spotted seals, ribbon seals, polar bears, Pacific walrus, and minke whales or information on their current feeding, resting, and migration habitats. Current maps of gray whale, Pacific walrus, beluga, polar bear, and other marine mammal feeding and migration areas are needed. Recent information should be compared with past information on benthic feeding areas for gray whales and walrus, including important areas for these species in the Chukchi polynya and sea ice edge (see maps in Phillips, R.L. 1987, Summary of geology, processes, and potential geohazards in the Northeastern Chukchi Sea at 21-31 in: D.A. Hale (ed.), Chukchi Sea Information Update. NOAA Ocean Assessments Division, Alaska Office. (OCS Study MMS 86-0097)).

Many of the mitigation measures relied upon to avoid environmental damage cannot be implemented without better baseline data. For instance, the draft PEIS promises that delicate biocenoses will be avoided. This is impossible to do without more information about the location of important habitats. For example, the existence of significant kelp beds, other than the Boulder Patch is likely, but their locations are unknown. The draft EIS notes:

Kelp beds are likely to occur elsewhere in the western Beaufort Sea but have not been systematically surveyed, and other kelp beds may be discovered as more areas are explored. Systematic surveys of macroscopic algae, especially kelp beds, have not been conducted in the northeastern Chukchi Sea.

DPEIS at III-42.

The draft PEIS acknowledges the lack of information for many species. While acknowledging the importance of squid as “the more dominant prey species for some marine fishes, seabirds, and marine mammals,” DPEIS at II-43, the draft EIS also reveals that there is no information on the species of squid inhabiting the areas in question and thus, the EIS cannot even provide a baseline description. Id.

The bibliography fails to include many important references. Virtually all scientific studies of pinnipeds and climate change impacts to polar bear and walrus are omitted from the bibliography.

2. *The PEIS needs to consider water quality.*

Water quality is a central concern to many stakeholders in this process. The increased vessel traffic in the pristine waters of the Arctic threaten to degrade water quality. In addition to routine discharges, there is the potential for spills during refueling, or in the event of an accident. In other parts of the draft PEIS the agencies acknowledge the potential for accidental spills. Accordingly, there should be a discussion of water quality in the PEIS.

3. *The EIS should have considered invasive species.*

The spread of invasive species through ballast water is a serious international problem, recognized by the National Research Council and the International Maritime Organization, and one that poses a heightened risk for the Arctic in coming years.³¹ Climate change only heightens the risk as previously unknown species may increasingly invade Arctic waters, threatening native species. Since the vessels used in the proposed surveys would come from outside Alaska, MMS must analyze the potential impact of invasive species and means to avoid introducing such species into the Arctic.

4. *The draft PEIS failed to consider right whales.*

The North Pacific right whale is the most endangered whale with a population perhaps as low as 100 individuals. The Chukchi provides potential habitat for this whale. According to NMFS, "The North Pacific right whale (*Eubalaena japonica*), historically rang[ed] in the North Pacific Ocean from latitudes 70° N to 20° N;" 69 Fed. Reg. 17560 at 17561; see Hideo Omura et al., *Black Right Whales in the North Pacific*, 13 SCI. REP. WHALES RES. INST. 1, 44 (1969). Moreover, North Slope Natives have reported seeing right whales in the Chukchi. Testimony was provided on this at the public hearing in Point Hope.³² Global climate changes may make this habitat even more important to right whales in coming years. Accordingly, the EIS should analyze the potential impact of seismic activity in the Chukchi on right whales.

Moreover, the increased activity in the Chukchi and Beaufort Seas brought about by increased exploration will lead to greater traffic through the Bering Sea, where right whales are known to exist. Even a single ship strike of a right whale could be significant to the species. Given this species' perilous status, an activity that could potentially impact even one individual, or impact current or potential habitat, should have been analyzed in the draft PEIS.

B. MMS Fails to Consider the Full Range of Alternatives

NEPA requires that, "to the fullest extent possible," agencies must "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E) (2000). To fulfill this requirement, the agency must prepare an EIS that "rigorously explore[s] and objectively evaluate[s] all reasonable alternatives" to the proposed action. 40 C.F.R. § 1502.14(a) (2003). That discussion of alternatives "is the heart of the [EIS]," *id.* § 1502.14, and it "guarantee[s] that agency decisionmakers 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." 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,

³¹ National Research Council, Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water (1996).

³² Point Hope Transcript

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)).

The PEIS should consider an alternative that bans seismic surveys during inclement weather. Bad weather can lower visibility rendering the marine mammal observers’ ability to verify the safety zone ineffective. In California, it is recommended that authorities halt surveys when conditions deteriorate to the point where visual observation becomes ineffective and where marine mammal densities are high enough to warrant concern.³³ Moreover, the draft PEIS indicates that “observers would need the use of high-intensity lighting to maintain vigilance for marine mammals when the surveys are being conducted during periods of darkness or poor visibility (e.g., during rain or fog).” DPEIS at III-63. Such lighting poses a hazard to birds who are attracted by light and vulnerable to striking vessels. *Id.* MMS should consider barring surveys during periods of low visibility to decrease the risks of harm to marine mammals and birds.³⁴

It is arbitrary for the agencies to eliminate from consideration an alternative that would limit the number of permits granted each year. The draft PEIS offers contradictory reasons for not considering this alternative. First, it states that since “the PEA on four surveys resulted in a FONSI, the one annual survey under this alternative can be assumed to have no significant impacts.” DPEIS at II-10. After making the assumption that one survey would necessarily have less impact than four, the draft PEIS goes on to state that “limiting the number of permitted or authorized seismic surveys would not necessarily reduce impacts.” *Id.* In addition, the assertion that such an alternative could not be reconciled with the purpose and need is unsupported. The draft PEIS fails to consider requiring information sharing as a means to eliminate potentially duplicative surveys. It is unclear why consolidation of uncoordinated seismic surveys through either a private or federal operator using a standardized methodology would not meet the objectives. The draft PEIS also fails to provide adequate grounds for refusing to consider any alternative that would set specific geographic restrictions to protect resources, including establishing an adequate corridor for fish and imposing as an exclusion zone the bowhead whale’s historic migration corridor. There was inadequate analysis of alternatives to preclude seismic testing in areas that are not inside lease plan areas. It also fails to consider alternatives that exclude critical or sensitive habitats (e.g. Ledyard Bay critical habitat area for spectacled eiders) or for other species such as the Pacific walrus, beluga whale, polar bear, for which denning, feeding, and migration areas are to receive protection under the Agreement on the Conservation of Polar Bears, an international treaty, or other species.

³³ High Energy Seismic Survey Team, High Energy Seismic Survey Review Process and Interim Operational Guidelines for Marine Surveys Offshore Southern California 31 (1999).

³⁴ Among the other alternatives the agencies should have considered are an alternative requiring passive acoustic monitoring, requiring the use of the lowest practicable source levels and establishing a process for independent verification of that standard, requiring long-overdue research on suppression of higher-frequency noise and other methods of noise reduction, and setting forth a plan to prevent the introduction of foreign species through ballast water.

The draft EIS also fails to provide adequate grounds for refusing to consider any alternative that would set specific geographic restrictions to protect resources, including establishing an adequate corridor for fish and imposing as an exclusion zone the bowhead whale's historic migration corridor.

Moreover, the draft PEIS refused without explanation to consider alternative data gathering methods, simply asserting "the environmental assessment of alternative geophysical-survey techniques is not part of this PEIS." DPEIS at II-5. Similarly, the PEIS eliminates Alternative 2 from further analysis. Given that this was the agency's proposed action it is irrational to eliminate it without further analysis.

C. Not enough site-specific information.

There is not enough site-specific information provided to assure that serious environmental harms will be avoided. As noted above, many of the mitigation measures rely upon avoiding sensitive habitats. However, the locations of these habitats are often not identified. To analyze the effects of the proposed seismic surveys, the draft PEIS must include site-specific information on each resource and analyze the differential impacts that would occur for each location where activities may take place.

D. Impacts of Seismic Activities Are Understated

MMS's assessment of impacts on marine life does not reflect the best available science and underestimates the extent to which the proposed surveys could disrupt the marine environment.

1. *Acoustic Impacts to Marine Mammals*

It is clear that MMS focused much attention in this draft PEIS on the impact of seismic survey noise on marine mammals. Given the potentially very serious consequences to marine mammals from the proposed surveys, including consequences to endangered bowhead whales, it is of paramount importance that this analysis be well-reasoned and based on the best available science. In several respects, MMS's analysis of this issue falls short.

First, MMS adopts noise-level thresholds for acoustic harassment that do not reflect sound science. At the core of MMS's assessment of acoustic impacts from the proposed seismic surveys are the thresholds it has established for physical injury, hearing loss, and significant behavioral harassment of marine mammals. Draft EIS at III-11 (adopting Level A harassment threshold at 180 dB for cetaceans and 190 dB for pinnipeds, and Level B harassment at 160 dB).³⁵ But recent literature indicates that very significant impacts to individuals and populations may occur at levels well below the 160 dB that MMS considers the minimum level at which behavioral harassment occurs.

³⁵ The problem with establishing a higher threshold for pinnipeds is discussed above in Section II.C.

For example, harbor porpoises have been reported to avoid a broad range of sounds—low-frequency (airgun pulses), mid-frequency (sonar transmissions), and high-frequency (acoustic harassment devices)—at very low sound-pressure levels (between 100 and 140 dB re 1 μ Pa).³⁶ As MMS is aware, ongoing research on sperm whales in the Gulf of Mexico shows impacts to foraging behavior from seismic survey noise at received decibel levels much lower than MMS’s threshold. Literature on grays, belugas, narwhals, and other species also indicate significant harassment at levels less than 160 dB.³⁷

Even at levels well below 160 dB noise can harm marine mammals by provoking avoidance behaviors and interfering with important biological functions. Studies suggest that “[i]ncreased noise levels could interfere with communication among whales, mask important natural sound, cause physiological damage, or alter normal behavior, such as causing avoidance behavior that keeps animals from an important area or displace a migration route farther from shore.”³⁸

MMS’s chosen thresholds are especially inappropriate for bowhead whales, which are “the most likely of ESA-listed baleen whales to be impacted by” the surveys at issue “because they commonly occur seasonally in the areas where seismic surveying activity could occur.” DPEIS at III-107. MMS itself acknowledges that the 120-dB isopleth has been shown to result in an “almost total bowhead whale exclusion.” DPEIS at III-11 (emphasis added). By any measure, the “total exclusion” of bowhead whales from an approximately 1200 km² area is a significant behavioral harassment, and MMS’s decision to set its threshold for harassment at a level *ten-thousand times* that which caused such a total exclusion is unsupportable.³⁹ Instead, this data supports an acoustic harassment threshold of no more than 120 dB.

Indeed, evidence indicates that bowheads may be even more sensitive to noise than was previously realized. “Received noise levels as low as 84 dB re 1 μ Pa (rms) or 6 dB above ambient may elicit strong avoidance of an approaching vessel at a distance of 4 km (2.5 mi)

³⁶ See, e.g., R.A. Kastelein, H.T. Rippe, N. Vaughan, N.M. Schooneman, W.C. Verboom, and D. de Haan, The Effects of Acoustic Alarms on the Behavior of Harbor Porpoises in a Floating Pen, 16 *Marine Mammal Science* 46 (2000); P.F. Olesiuk, L.M. Nichol, M.J. Sowden, and J.K.B. Ford, Effect of the Sound Generated by an Acoustic Harassment Device on the Relative Abundance of Harbor Porpoises in Retreat Passage, British Columbia, 18 *Marine Mammal Science* 843 (2002); J. Calambokidis, D.E. Bain, and S.D. Osmeck, Marine Mammal Research and Mitigation in Conjunction with Air Gun Operation for the USGS ‘SHIPS’ Seismic Surveys in 1998 (1998) (report to Minerals Management Service); NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington, 5 May 2003 at 10 (2005).

³⁷ For a summary of some of this research, see Richardson *et al.*, *Marine Mammals and Noise* 255-57 (belugas and narwhals), 275-76 (belugas and narwhals), 298 (grays and bowheads),

³⁸ See Lease Sale 202 EA at 54.

³⁹ It should not be surprising that the scientific literature fails to support 160 dB as the level at which behavioral impacts are first seen, since MMS’s choice of this level is essentially arbitrary and not the product of reasoned consideration of recent science. The level derives from a seven-year-old “interim” assessment of seismic survey impacts. See High Energy Seismic Survey Team, High Energy Seismic Survey Review Process and Interim Operational Guidelines for Marine Surveys Offshore Southern California at App. 5 (1999)

(Richardson and Malme, 1993).”⁴⁰ “Migrating bowhead and gray whales divert around sources of noise, whether actual industrial activities or playbacks of industrial activities (Richardson et al., 1995) with almost all bowheads reacting at received levels of 114 dB re 1 μ Pa.”⁴¹

Nor do the thresholds employed account, in any way, for longer-term effects of noise exposure. MMS’s acoustic thresholds are based solely on its assessment of immediate marine mammal responses, such as alteration of migration. The use of these thresholds ignores more subtle behavioral impacts on marine mammals, which might be expected to occur after weeks, months, and indeed years of seismic activities in these waters. This approach also does not fully account for the problem of repetition: the way that apparently insignificant impacts, such as subtle changes in dive times or vocalization patterns, can become significant if experienced repeatedly or over time.⁴² The level at which such subtle changes occur could fall well below MMS’s harassment threshold of 160 dB.

MMS incorrectly asserts that “the bowhead whale is the only cetacean in the Proposed Action area to show avoidance near the 120 dB received sound levels from impulse sounds and all other cetaceans in the Proposed Action area have generally demonstrated avoidance at higher received sound levels (i.e., 160 to 180 dB)” DPEIS at II-20. This is incorrect. Beluga whales have been shown to react to sounds as low as 105 dB and should be considered likely as sensitive as, if not more sensitive than, bowhead whales.⁴³ As noted above, gray whales have also been documented to react to sounds below 160 dB.

The draft PEIS appears to acknowledge its inadequacy with respect to beluga whales. In it MMS states that additional analysis must then be considered on how seismic activity considered under the PEIS may affect these concentrations of whales, especially when they are engaged in important biological behaviors such as feeding or molting.” DPEIS at II-157. The time for conducting such analysis is now, but the draft EIS fails to do so.

For all of these reasons, MMS should reassess its harassment thresholds for acoustic impacts to marine mammals to take into account the latest science, differences in reactions between species, and longer-term effects.

Second, MMS does not deal at all with the literature indicating that seismic surveys may result in whale strandings. In 2002, for example, two beaked whales (*Ziphius cavirostris*) were found to have stranded in the Gulf of California, Mexico, coincident with geophysical surveys

⁴⁰NMFS, 2006 Arctic Region Bi Op.

⁴¹ NRC Noise and Marine Mammals 2003 at 92.

⁴² The importance of this problem for marine mammal conservation is reflected in a recent NRC report, which calls for models that, inter alia, translate such subtle changes into disruptions in key activities like feeding and breeding that are significant for individual animals. National Research Council. Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects 35-68 (2005).

⁴³ Finley, K. J., G.W. Miller, R.A. Davis, and C.R. Greene. 1990. Reactions of belugas, *Delphinapterus leucas*, and narwhals, *Monodon monoceros*, to ice-breaking ships in the Canadian High Arctic, p. 97-117. In T.G. Smith, D.J. St. Aubin, and J.R. Geraci [ed.] Advances in research on the beluga whale, *Delphinapterus leucas*. Can. Bull. Fish. Aquat. Sci. 224.

that were being conducted in the area.⁴⁴ That same year, endangered adult humpback whales were reported to have stranded in unusually high numbers along Brazil's Abrolhos Banks, where oil-and-gas surveys were being conducted.⁴⁵ Neither paper is cited or discussed by MMS. Instead, MMS states summarily that "injuries directly from seismic survey noise are not expected to occur," relying on as-yet unformed mitigation measures to support this conclusion without any analysis of the risk of strandings. PDEIS at III-110.

Even if MMS considers the possibility of seismic-related strandings remote, the law requires agencies to evaluate all "reasonably foreseeable" impacts, which, by definition, includes "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." 42 C.F.R. § 1502.22. The scientific literature supporting strandings rises far above this standard, and MMS's failure to deal with the possibility of strandings seriously is arbitrary and capricious.

Third, the potential for population effects for walrus should be assumed to be high. The population is already in decline and being impacted from climate change. Climate change impacts are not yet well-documented, but are acknowledged in the scientific literature. Walrus impacts from development could be secondary and go undetected due to a lack of study and cooperation with Russia on population abundance studies. As noted in the draft EIS, as loss of ice occurs walrus are forced to use land haulouts creating a host of impacts (trampling of calves, loss of food due to local overconsumption and competition). Each of these stresses to the population makes it all the more important to thoroughly analyze impacts from seismic surveys. MMS does not adequately describe the potential disturbance that seismic surveys may have on mother walrus and dependent young. It fails to identify the range at which mother and dependent young may detect and avoid seismic operations or account for the possibility that dependent young may become separated from their mothers as a result of disturbance from seismic operations. *See* discussion at PDEIS at III-155. The potential for population effects for walrus should be assumed to be high.

Fourth, MMS does not adequately describe the potential disturbance of seismic surveys to polar bears, whose swims along the coast and to ice floes well offshore are likely to be physiologically and energetically demanding. Polar bears are known to drown while making such swims. Especially in light of FWS's decision in 2006 to consider listing polar bears under the Endangered Species Act and the increasing threat to polar bears posed by climate change, *see* DPEIS at III-147, MMS should identify the range at which swimming bears may detect and attempt to avoid seismic vessels, describe the energetic costs of such avoidance, and give a thorough assessment of the impacts of such surveys to polar bear populations. Qualitative assertions that polar bears encountering seismic surveys "may be temporarily deflected from their chosen path" are insufficient. DPEIS at III-159.

⁴⁴ Hildebrand, J., "Impacts of anthropogenic sound on cetaceans," Paper submitted to the IWC Scientific Committee (2004) (SC/56/E13).

⁴⁵ Engel, M.H., M.C.C. Marcondes, C.C.A. Martins, F. O Luna, R.P. Lima, and A. Campos, "Are seismic surveys responsible for cetacean strandings? An unusual mortality of adult humpback whales in Abrolhos Bank, Northeastern coast of Brazil," Paper submitted to the IWC Scientific Committee (2004) (SC/56/E28).

Fifth, MMS's calculation of permanent threshold shift (which it equates to the onset of injury) may be based on an improper model. A recent study of threshold shift in pinnipeds found that the amount of hearing loss an animal experiences does not increase linearly with the energy it receives. As the energy intensifies, its rate of hearing loss increases, to such a degree that projections of permanent threshold shift according to traditional, linear models are likely to result in underestimates of harm.⁴⁶ Given the uncertainties presented by this study, MMS should lower its estimate of auditory injury.

For all these reasons, MMS's analysis of the impacts of the proposed seismic surveys on marine mammals is inconsistent with the latest scientific literature on acoustic impacts, and, if adopted in a Record of Decision, would violate NEPA.

2. *Acoustic Impacts on Fish and Fisheries*

The draft EIS states that existing information “has not demonstrated that seismic surveys alone would result in significant impacts to marine fish or related issues (e.g., impacts to migration and spawning, rare species, subsistence fishing.” DPEIS at III-46. Though it is true that data gaps exist, in several respects the DPEIS ignores or fails to account for the best available evidence on impacts to fish.

MMS's conclusion that impacts to fish would be insignificant is undermined by its own acknowledgment that catch rates are reduced within very large areas around seismic operations. When discussing the widespread reductions in catch rates recorded in studies by Engås, Løkkeborg and Soldal, DPEIS at II-38, MMS states that the “pelagic fish-catch rates and local abundance were reduced within 33 km of the airgun array for at least 5 days after shooting.” *Id.* This is a potentially substantial impact that could threaten other wildlife that prey upon fish. Moreover, neither of the studies cited concluded that a 33 km radius around an air gun array is the outer-most extent of a potential fish displacement area, as the DPEIS seems to assume. Rather, these studies simply did not survey catch rates beyond 33 km. Given the dramatic reduction in catch rates that resulted from these studies—as high as 80% in one survey—the agencies should assume that the use of air gun arrays may exclude fish over greater distances.

In addition, MMS concludes that “sound sources that have resulted in documented physiological damage and mortality of adult, juvenile, and larval fish have all been at or above 180 dB re 1 μ Pa (Turnpenny and Nedwell, 1994).” DPEIS at III-48. This conclusion ignores McCauley et al. (2000 and 2003), which found physiological damage (likely permanent) to the hair cells of the inner ears of adult fish. Although it is true that McCauley et al. exposed fish to a maximum sound level of 182 dB re 1 mPa².s (193 dB re 1 mPa), the study also calculates when potentially damaging displacement of the hair cells began, concluding that “[t]he point at which the maximum displacement begins to rapidly increase lies between 155-160 dB re 1 mPa².s” or, using McCauley's assumptions, approximately 166 - 171 re 1 μ Pa for a single pulse (see Figure 1, taken from McCauley et al. (2000)). Thus, the DPEIS's implicit conclusion that

⁴⁶ D. Kastak, B.L. Southall, R.J. Schusterman, C.R. Kastak, Underwater Temporary Threshold Shift in Pinnipeds: Effects of Noise Level and Duration, 118 *Journal of the Acoustical Society of America* 3154, 3161 (2005).

physiological damage or mortality to adult or juvenile fish will not be caused at levels below 180 dB re 1 μ Pa is unwarranted.

Finally, with regard to squid, the DPEIS contains essentially no substantive discussion of impacts from seismic surveys, and fails to mention the association between such surveys and squid strandings. DPEIS at III-47. Given the association between the multiple strandings and deaths of at least one species of squid to airguns—as well as the well-documented strong startle response exhibited by others—this omission must be remedied.⁴⁷ This is especially true in light of the fact that following last year’s seismic testing in the Chukchi, local residents reported dead squid washing up onshore.⁴⁸

3. *Other Impacts to Marine Life*

Impacts from the proposed seismic surveys are not limited to the overt physiological and behavioral effects of ocean noise. Risks from increased vessel traffic, invasive species, and potential oil spills are significant but not well analyzed by the DPEIS.

Vessel traffic will consist of seismic survey vessels and associated support vessels, including icebreakers and fuel-supply ships. Table I.C-1. Along with this increased traffic comes an increased risk of ship strikes, which may be exacerbated by temporary or permanent hearing damage caused by the seismic activity being conducted. Each time fuel is supplied to these vessels, there is some risk of a fuel spill. And since these vessels will be entering Alaskan waters from outside waters, they also bring with them a serious risk of introducing invasive species—especially since simple mitigation measures such as requiring ballast water exchanges outside Alaska’s EEZ, recent hull cleaning and washing of survey equipment do not appear to be required.⁴⁹ The introduction of non-native species to Alaska poses potentially significant ecological and social impacts. MMS must better evaluate impacts and propose mitigation for each of these categories of harm.

4. *Impacts to Subsistence*

MMS acknowledges that “Inupiat whalers suggest[] that the fall bowhead migration tended to be farther offshore when there was abundant seismic work off northern Alaska.” DPEIS at III-113. This accords with studies showing that most bowheads avoid the area within about 20-30 km of operating airguns. *Id.* at III-114. Yet the draft PEIS fails to analyze adequately the impact of this behavioral change, or the impact of changes in fish behavior and local abundance, on subsistence communities. MMS’s analysis of subsistence impacts is flawed

⁴⁷ Angel Guerra, Institute for Marine Investigations, Vigo, Spain, Presentation to the Annual Science Conference of the International Council for the Exploration of the Sea (2004).

⁴⁸ Transcript of Point Hope hearing

⁴⁹ See Gollasch, S. 2002. The importance of ship hull fouling as a vector of species introductions into the North Sea. *Biofouling* 18(2):105-121.

for all of the reasons, discussed above, that its analysis of impacts to species relied on by subsistence communities is flawed. Those reasons are incorporated herein.

Last year, walrus did not haul out on the coast near the village of Point Hope, as they usually do in the fall. As a result hunters from the village of Point Hope could not harvest any walrus in the fall. *See* Transcript of Public Hearing in Point Hope on the Programmatic DEIS Seismic Surveys in the Beaufort and Chukchi Seas (April 23, 2007) at 23-24 (Exhibit A). This example illustrates that seismic operations can have, and in fact have had significant impacts on the subsistence use of walrus.

E. Cumulative Impacts Are Overlooked

The cumulative impacts analysis is incomplete and fails to address all potential impacts to fish, wildlife and their habitats, subsistence, Alaska Native culture and human health. EPA's review of the DPEIS concluded that this analysis was insufficient and "requested that the cumulative effects analysis be expanded." (72 FR 30589, June 1, 2007). We note that the analysis is based on outdated information regarding the Presidential moratoria for the North Aleutian Basin Planning Area which is now included in the 2007-2012 Five-Year Plan.

The analysis is fundamentally flawed because the draft PEIS arbitrarily ignores the combined impacts of seismic surveys and exploration drilling in both its "cumulative activities scenario" and "Cumulative impact analysis." DPEIS at I-7. The agencies neglect their duties to analyze the proposed action even though Shell had included a description of seismic surveys as part of its Beaufort Sea Outer Continental Shelf Lease Exploration Plan, 2007 – 2009 submitted to the MMS.⁵⁰ The draft PEIS fails to adequately analyze the combined impacts of foreseeable oil and gas leasing, exploration and production activities occurring in these waters this year and seasons to come, as well as onshore across the North Slope. It also fails to analyze the impacts of other industrial and military activities in the region and fails to consider the additive noise impacts of scientific research sonar, seismic, and vessel traffic.

Shell's Exploration Plan explains that the seismic survey areas include Phoenix-Anago (Cornell) Prospect, which is located next to and within the Cross Island whaling exclusion zone, and the Sivulliq prospect located in both the Kaktovik and Cross Island whale hunt exclusion zones (Executive Summary at 1). Exploratory wells are shown at the Sivulliq prospect and Olympia (near Kaktovik – east of the others and "upstream" or where the bowhead whales pass first on their fall migration). Therefore, this case study shows that seismic surveys and drilling are planned for the same areas during 2007. But the potential seismic area encompasses millions of acres in the Beaufort Sea and even broader area in the Chukchi Sea, and the potential drilling could occur on any lease blocks (both those existing today, as well as in future lease sales). So this combined impact to bowhead whales, beluga whales, ringed seals, threatened

⁵⁰ Shell Offshore Inc., January 2007, Beaufort Sea Outer Continental Shelf Lease Exploration Plan, 2007 – 2009, Executive Summary, p. 1; http://www.mms.gov/alaska/fo/ExplorationPlans/shell_exploration_plan/Executive%20Summary.pdf, (accessed July 27, 2007).

Steller's and spectacled eiders, polar bears, Pacific walrus, and other marine mammals was not addressed by the DPEIS.

The agencies make a misleading assertion "this Draft PEIS will also not assess potential oil and gas activities (e.g. exploration drilling, etc.) in federal waters that have already been evaluated in Beaufort Sea sale-related environmental assessment documents or in the Chukchi Sea Lease Sale 193." DPEIS at I-7. In fact, those documents did not address the site-specific direct effects of any drilling or seismic projects, or the cumulative effects of combined seismic and exploratory drilling, or the combined effects of activities occurring in both the Beaufort and Chukchi Sea. Furthermore, the past Beaufort Sea Lease Sale EIS and EAs were inadequate on many environmental grounds. In those Beaufort Sea NEPA documents, MMS also did not evaluate any mitigation stipulations regarding protective measures for marine mammals (various safety zones for marine mammals as described in alternatives 3-9 in this DPEIS). NMFS/MMS cannot rely on its analysis in the Chukchi Sea Sale 193 Final EIS because MMS did not analyze the cumulative effects of noise disturbance considering the full array of alternatives, including the range of safety-zone mitigation measures evaluated in the draft PEIS.

In its Notice of Intent to prepare a Programmatic Environmental Impact Statement, NMFS stated that the

activities that will be analyzed in the Draft PEIS will include conducting marine-streamer 3D and 2D seismic surveys, high-resolution site seismic surveys, and ocean-bottom-cable seismic surveys.... The Draft PEIS's cumulative activities scenario and cumulative impact analysis will focus on oil and gas-related and non-oil and gas-related noise-generating events/activities in both Federal and State of Alaska waters that have been authorized or conducted in the past and that are reasonably likely and foreseeable. Noise contributions from community and commercial development, military activities, and arctic warming will also be considered.

71 Fed. Reg. 66914 (November 17, 2006). Beside ignoring noise, disturbance, and other impacts of drilling exploration wells themselves, the draft PEIS does not analyze other impact sources associated with drilling. These include impacts associated with the excavation of mud-line well cellars (glory holes) which could include possible use of an ice-breaker. Also, at each drilling location, there will be shallow hazard site clearance surveys (marine surveys using multi beam sonar, single-beam sonar, side scan sonar, to collect seabed and subsea bed data for bathymetry mapping, ice and streudel scours, potential biological resources and underwater obstructions) to support the MMS drilling permits (Shell, Exploration Plan, January 2007, Executive Summary at 1). These studies are proposed to be done annually during 2007, 2008, and 2009. The draft PEIS has not analyzed the cumulative effects from these sound sources, which have the potential to affect marine mammals, fish, and other marine life far from the vessels producing the sound. Furthermore, the additive disturbance and spill risk from boats and ships posed by these additional vessels to marine life, birds, and subsistence activities has not been considered. These proposed surveys overlap the proposed time period for seismic surveys, as well as drilling. (Shell Exploration Plan, January 2007, Executive Summary, Attachment A, Drilling Exploration Plan Timeline).

The Cumulative Activity Scenario downplays potential oil development in the Beaufort. DPEIS at III-15. In fact, it does not even reveal that there is a past oil discovery at the Hammerhead Prospect, now called Sivulliq (aka Siv Ullig), and that the “exploration” wells there are “delineation” wells of the known discovery. Shell’s exploration plan describes the drilling that will take place along a potential oil development pipeline route from the Sivulliq prospect. According to the MMS, development of Hammerhead, Kuvlum and a number of other Beaufort Sea fields are considered reasonably foreseeable, (MMS, February 2003, Beaufort Sea Planning Area Oil and Gas Lease Sale 186, 195, and 202 Final EIS, Vol. III, Table V-6a) yet cumulative impacts from these developments are not included in the DPEIS, rendering it an ostrich like view of the world. The draft PEIS also should describe the cumulative effects from production drilling and development activities in this area.

The draft PEIS fails to analyze all impacts of geological and geophysical oil and gas exploration. Many of these other surveys will take place simultaneous with the seismic surveys and will add noise sources that could be significant. These other geological and geophysical surveys would help achieve purposes of the seismic activity, e.g. to further assess the oil potential and location of potential oil reservoirs. Therefore, the draft PEIS also needs to address cumulative effects from other geological and geophysical survey methods which may also be used simultaneously or successively during the season (electromagnetic, aeromagnetic, and gravity surveys) which would be additional noise sources from helicopters and aircraft and boats. While the draft PEIS acknowledges in the “No action” alternative that these types of surveys may take place, DPEIS at II-13, it fails to consider their direct, indirect, or cumulative impacts.

The cumulative effects of other activities, including on-ice seismic surveys conducted by Shell and other companies need to be addressed because species could be impacted different times of the year, thereby adding to the effects of open water seismic and drilling. In particular polar bear denning, feeding and migration, ringed seal pupping lairs, fish, and subsistence activities are vulnerable.

Also ignored in the cumulative impact analysis are noisy pre-development studies for potential buried subsea pipeline routes from the Sivulliq proposed seismic survey and drilling vicinity to landfall at Point Thomson (Shell, Exploration Plan, January 2007, Executive Summary at 2). Additional noise and disturbance will result from drilling 8 boreholes to depths of 400 feet for geotechnical soil data and conduct of other marine surveys using multi beam sonar, single-beam sonar, and side scan sonar. Such studies will be in 2007, and “future geotechnical surveys may be proposed annually.” (Shell, Exploration Plan, January 2007, Executive Summary at 2). These proposed surveys overlap with the proposed time period for seismic surveys, as well as drilling (Shell Exploration Plan, January 2007, Executive Summary, Attachment A, Drilling Exploration Plan Timeline).

The draft PEIS fails to adequately quantify existing and reasonably foreseeable ship and other vessel traffic including barge, helicopter, hovercraft, and other aircraft flight noise that is associated with offshore exploration, including drilling, as well as onshore operations and scientific studies supported by MMS or relied upon by MMS and NMFS in these seas. MMS does not quantify the total existing or potential aircraft levels either on the OCS, over the Beaufort Sea or Chukchi Sea coasts, nor related to onshore activities, and downplays its potential

cumulative effects by stating “much of this air traffic occurs over land.” DPEIS at III-14. It downplays helicopter support traffic for existing and future offshore oil development in the Cumulative Activity Scenario by failing to quantify flight numbers, DPEIS at III-15, later listed as 989 round-trip flights [1,978 total overflights] to Northstar from June 16 – October 31, 2001. DPEIS at III-212.

While the DPEIS states that vessel traffic associated with exploration activities (drilling vessels, support vessels, and ice breakers) “is expected to increase,” DPEIS at III-14, the assumptions for analysis does not state how many vessels this will entail, specifically when and where they will travel, nor does it provide numerical description or shipping routes for other noise-producing vessel traffic.

The draft PEIS must include description of seismic testing, drilling, and associated activities ongoing or planned to occur in the Canadian Beaufort Sea, along with analysis of how that surveying will potentially magnify impacts to marine species, especially those with habitat in both waters. It also needs to address how the cumulative impacts of this activity may affect indigenous people in Canada, as effects to the endangered bowhead whale migration could affect the whale in that country. Similarly, the draft PEIS should include analysis of increased offshore oil activities in Russian waters and their impact on species with trans-boundary habitat.

The cumulative impacts analysis fails fully to analyze climate change. There is no future cumulative activity scenario addressing future climate change effects, and the draft PEIS fails to reference the most recent modeled impacts reported by the IPCC (2007), the Arctic Climate Impact Assessment, or other reports in its overall assumptions for the analysis, nor does it explain the impacts depending on the various climate models regarding reductions of greenhouse gas emissions or business as usual. A major source of new impact as sea ice melts is increased levels of shipping traffic, including potentially crude oil and LNG tanker traffic through the Beaufort and or Chukchi Seas, and increased traffic by ice-breaking vessels.

The draft PEIS has not adequately considered the cumulative impacts of habitat and animal’s behavioral changes resulting from climate change plus the additive impacts of seismic and drilling disturbance and pollution to the Pacific walrus, and other marine mammal species. For example, it does not describe how seismic survey noise and disruption could have additional impacts to Pacific Walrus feeding and resting. The draft PEIS does not analyze how seismic surveys could disrupt the already vulnerable animals and negatively change their behaviors. *See* DPEIS at III-24. Results of a new field study of Pacific Walrus by U.S. Geological Survey biologists notes that the animals are not staying near the sea ice, but are on smaller chunks of fragile ice in the shallower water where their clam and other food sources are located and females are much less able to swim long distances, especially with their young, than males are (see <http://media.akradio.org/2007/ak-20070728.mp3>; <http://aprn.org/2007/07/27/scientists-watching-walrus-movements-as-sea-ice-recedes>; <http://alaska.usgs.gov/science/biology/walrus>). The draft EIS fails to analyze the consequences of bumping the walrus from their small ice chunks due to seismic survey vessel traffic. Also, there are strange, unaccounted walrus behaviors that have been reported recently, such as an animal swimming up the Kobuk River.

The DPEIS excluded analysis of air quality, water quality, terrestrial mammals (including caribou), and coastal wetlands, even though there could be significant cumulative effects from

seismic exploration combined with other exploration and development activities in the Beaufort and Chukchi Sea, and onshore. The DPEIS fails to address effects on the wilderness, or wild ocean values, of the Beaufort and Chukchi Sea and its adjacent coastal resources including the Arctic National Wildlife Refuge (where proposed seismic surveys could be conducted just 3 miles away from designated wilderness), Alaska Maritime National Wildlife Refuge, Teshekpuk Lake Special Area, Kasegaluk Lagoon Special Area and Utukok Uplands Special Area within the National Petroleum Reserve-Alaska.

The DPEIS does not analyze potential chronic or major fuel oil, crude oil, and other toxic substance spill impacts and air pollution impacts to the ocean waters.

While direct impacts to fishery resources are described, and the DPEIS concludes that all the alternatives except no action “could adversely impact EFH (Essential Fish Habitat) and fish/fishery resources, DPEIS at III-51, the document does not analyze cumulative impacts to fish and fishery resources.

It also fails to consider how adverse impacts to fish in combination with climate change effects and other impacts excluded from the PDEIS analysis may negatively impact marine mammals and other fish and wildlife up the food chain.

The draft PEIS fails to fully analyze cumulative impacts to threatened Steller’s and spectacled eiders, and does not consider an action alternative that would completely avoid surveys within the Ledyard Bay critical habitat area. It also does not address cumulative effects of fuel or oil spills on these threatened species. It ignores the cumulative impacts of seismic and other noise disturbance and pollution on the benthic habitats spectacled eiders depend on for feeding during the molt in the Chukchi.

The cumulative impact analysis of polar bears is insufficient. There is plenty of scientific information indicating that this species is being affected by a variety of impacts including climate change and over hunting in Russia. The draft EIS should discuss the fact that the U.S. Fish and Wildlife Service has proposed the polar bear as a threatened species is not addressed.

Cumulative impacts on subsistence harvest patterns is incomplete, and an analysis of the total effects on all major subsistence resources (including fish, birds, and marine mammals) as it would affect availability of subsistence resources was not adequately done. The sections entitled “Nuiqsut’s views on cumulative effects,” “Kaktovik’s views on cumulative effects,” etc., DPEIS at III-231 to 232, are useful in that they provide evidence of the long duration of environmental injustice and lack of responsiveness by the federal agencies to local Inupiat communities and failure to provide sufficient environmental impact reviews, but they do not synthesize comprehensively the traditional and local knowledge that is available to be included in the EIS analysis. The PDEIS conclusion is misleading and downplays the cumulative impacts to subsistence harvest patterns and subsistence resource availability from seismic surveys, and the combined effect of seismic surveys along with all the other oil and gas activities taking place on the North Slope and Beaufort and Chukchi Seas. DPEIS at III-234.

F. Environmental Justice

The cumulative impacts section on Environmental Justice, DPEIS at III-234, downplays offshore impacts, especially from seismic surveys and risks of spills from offshore drilling and development, despite confirmation of such effects on Alaska Native people and their culture found by the National Research Council (2003). Upon what basis do the federal agencies base the conclusion that “most of the stress factors mentioned by local stakeholders normally can be associated with onshore impacts”? DPEIS at III-234.

The Significance Thresholds for Environmental Justice erroneously ignore the fundamental issue that Inupiat and Alaska Native communities face disproportionate effects on a nationwide basis, as well as on a regional basis by the proposed program, as well as by the MMS Beaufort and Chukchi Sea offshore programs. With significant environmental justice as the baseline condition, the draft PEIS still needs to conduct a full analysis of the direct, indirect, and cumulative Environmental Justice impacts.

While the draft PEIS lists as Significant Thresholds for Environmental Justice high adverse impact to human health, chronic disruption of socio-cultural systems, and oil spill or contaminants effects on subsistence foods, *see* DPEIS at III-23, there is no analysis of the direct, indirect, or cumulative impacts in these areas, therefore there is no evidence provided for the conclusions which downplay Environmental Justice impacts. The National Research Council (2003) found in its study, Cumulative environmental effects of Alaska North Slope oil and gas activities, that there are impacts such as community stress and others even at the planning stage, yet the DPEIS ignores analysis of many of the types of effects where it had identified significant concerns.

Inupiat/Alaska Native communities faced environmental injustice due to poor public noticing and conveyance of essential information on its offshore program activities. While the draft PEIS states that “MMS has taken measures to more carefully plan the number and timing of meetings with regional tribal groups and local governments,” DPEIS at III-191, in fact it has not held adequate public hearings or meetings in the smaller communities on its programs, nor has the NMFS. The draft PEIS does not list the actual public meetings that were held in each community, nor the advance notification and publicity it conducted to inform the public ahead of time.

For example, the conduct of public hearings were not fair because the public did not have adequate time to evaluate the document prior to the hearings, as the first hearing (in Anchorage) was held just 10 days after the March 30, 2007 Federal Register Notice announcing the availability of the draft PEIS. The schedule did not respect the needs of the public, especially local Inupiat residents on the North Slope because they were given very little notice to put the event on their calendar, nor to evaluate the DPEIS findings, alternatives, and mitigation measures. The NMFS announced the hearing schedule on April 6, 2007 (72 Fed. Reg. 17117) and the hearings began 4 days later in Anchorage and 11 days later in Nuiqsut, 12 days later in Barrow, and 17 days later in Point Hope. It is our understanding that a hearing was never held in at least one of the coastal North Slope communities, and not at all at other communities such as Kotzebue, Atkasuk, Anaktuvuk Pass and others which depend on the marine mammals and other

resources of the Beaufort and Chukchi Seas. Neither MMS nor NMFS provides a summary document that is readable by the general public and that contains maps and graphics explaining its proposal, alternatives, and locations of key fish and wildlife resources and subsistence resources and activities. Therefore, the public is not adequately informed by the publication of the DPEIS, and adequate time prior to the hearings is necessary in order to inform the public about the proposal and its impacts.

The draft PEIS lists a number of measures that “would serve collectively to mitigate disturbance effects on environmental justice,” DPEIS at III-195, but the federal agencies fail to define “mitigate,” nor do they explain the impacts that cannot be mitigated, or that there are ongoing cumulative effects. Furthermore, the measures listed would not address potential effects to all species that the Inupiat and Alaska Native communities depend on, including many species of fish, migratory birds, and marine mammals. Gwich’in and other Alaska Native communities may also be affected by negative cumulative impacts from activities in the region (NRC 2003), including from coastal aircraft disturbance and potential spills affecting caribou that rely on the shorelines for insect-relief and calving habitat, yet these impacts were not described.

G. Inadequate Analysis of Mitigation Measures.

The draft PEIS repeatedly relies on mitigation measures to eliminate potentially significant environmental impacts. Most of these measures, however, are unidentified, undefined, and not analyzed adequately. The chapter on mitigation measures focuses on the marine mammal safety zones and fails to analyze the effectiveness of measures intended to protect other resources. In an EIS, an agency must describe and analyze the effectiveness of proposed mitigation measures. See 40 C.F.R. § 1502.16(h) (stating an EIS “shall include discussions of . . . means to mitigate adverse environmental impacts”). “The requirement that an EIS contain a detailed discussion of possible mitigation measures flows both from the language of the Act and, more expressly, from CEQ’s implementing regulations.” Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 351 (1989). “Mitigation must ‘be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated.’” Neighbors of Cuddy Mountain v. United States Forest Serv., 137 F.3d 1372, 1380 (9th Cir. 1998) (quoting Carmel-By-the-Sea v. U.S. Dep’t of Transp., 123 F.3d 1142, 1154 (9th Cir. 1997) (quoting Robertson, 490 U.S. at 353)). The draft PEIS fails to analyze many mitigation measures.

For instance, the draft PEIS states that impacts to threatened Steller’s and spectacled eiders will be prevented by “the implementation of measures to mitigate impacts to marine and coastal birds.” DPEIS at III-64, III-65. These measures would include the condition that “seismic survey and support vessels will minimize operations that require high-intensity work lights High-intensity lights will be turned off in inclement weather when the seismic vessel is not actively conducting seismic surveys.” DPEIS at IV-6. The draft PEIS, however, fails to discuss that this condition conflicts with the requirements of the marine mammal monitoring program. Elsewhere in the draft EIS it is acknowledged that “observers would need the use of high-intensity lighting to maintain vigilance for marine mammals when the surveys are being conducted during periods of darkness or poor visibility (e.g., during rain or fog).” DPEIS at III-

63. The PEIS should acknowledge and discuss the fact that these mitigation measure may conflict instead of blithely assuming both will be fully successful.

Many of the mitigation measures the draft PEIS relies upon are illusory and provide no substantive protection. For instance, one condition provides no seismic surveying would be allowed in the spring lead system of the Chukchi Sea before July 1, unless approved by MMS in consultation with NMFS.” DPEIS at I-6. This condition provides no additional protection, however, because all seismic operations must be approved by MMS in consultation with NMFS.

Moreover, some of the mitigation measures relied upon are shown by the PEIS’s own analysis to be ineffective, yet MMS assumes that they will reduce impacts. For instance, the PEIS acknowledges that “[t]he ability of observers to effectively monitor the zone, and be able to call for a shut-down if marine mammals enter the zone is critical to the success of the protective measure described in Alternatives 3 through 8, though it is often difficult to observe all marine mammals, especially pinnipeds, within the zone.” DPEIS at II-19. Thus, the draft PEIS admits that the entire exclusion zone approach that is relied upon in all of the alternatives cannot be fully implemented.

III. Other Laws

A. Endangered Species Act

Before any seismic surveys are authorized, MMS should initiate new endangered species consultations with NMFS and FWS for the bowhead whale, the North Pacific right whale, and the spectacled and Steller’s eiders.

1. *The 2006 bowhead whale biological opinion is inadequate.*

The 2006 biological opinion fails adequately to consider important relevant factors—most notably, global climate change. The biological opinion is dismissive of potential impacts of climate change on bowhead whales. Given that this species’ life history is closely associated with the ice edge, it is untenable to assert that receding Arctic ice would have no impact on the bowhead whale. Moreover, the draft PEIS reveals that climate change could bring increased shipping and potential commercial fishing within the bowhead’s range, leading to increased disturbance and mortality to bowhead whales. This potential, however, was overlooked in the 2006 biological opinion.

2. *A consultation on the North Pacific right whale is needed before any seismic testing is authorized.*

As noted above, the Chukchi provides current and potential habitat for the endangered North Pacific right whale. Moreover, the increased level of seismic activity increases traffic through the Bering Sea where right whales are likely to be present. In addition to analyzing the potential impacts to these whales in the PEIS, NMFS needs to prepare a biological opinion on these whales.

3. Spectacled and Steller's eiders

Both spectacled and Steller's eiders migrate through the Chukchi and along the Beaufort. Because these birds fly at low altitudes, they are susceptible to striking ships. Moreover, the Chukchi provide important molting habitat for spectacled eiders. The draft PEIS itself acknowledges the risks to spectacled eiders, "a spill in the vicinity of Ledyard Bay during the late June through mid-October molt period . . . could affect large numbers of flightless spectacled eiders, resulting in significant harm to the Arctic Coastal Plain breeding population" DPEIS at III-69. These risks trigger the need for an ESA consultation.

B. MMPA

MMS recognizes that any seismic surveys conducted under this DPEIS will require authorization from NMFS under the Marine Mammal Protection Act, 16 U.S.C. § 1361 *et seq.* DPEIS at I-5. MMS and NMFS must take care to ensure that such surveys conform with the incidental take provisions, including the "small numbers" and "negligible impact" standards, of the MMPA. *See, e.g., NRDC v. Evans*, 279 F. Supp. 2d 1129, 1141 (N.D. Cal. 2003). In addition, NMFS must prescribe the methods and means of effecting the "least practicable adverse impact" on species and stock and their habitat. *Id.* The alternatives considered in the draft PEIS do not include adequate mitigation measures to form the basis for an incidental harassment authorization. Because NMFS apparently may rely on this Programmatic EIS to support its own decision-making on permit applications under the MMPA, *see* DPEIS at I-5, it is especially important that NMFS ensure all flaws and omissions in the draft PEIS are corrected.

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