

**ALASKA WILDERNESS LEAGUE—AUDUBON ALASKA—CENTER FOR
BIOLOGICAL DIVERSITY—EARTHJUSTICE—NATURAL RESOURCES DEFENSE
COUNCIL—NORTHERN ALASKA ENVIRONMENTAL CENTER—OCEAN
CONSERVATION RESEARCH—PACIFIC ENVIRONMENT—SIERRA CLUB—
WORLD WILDLIFE FUND**

September 17, 2012

VIA EMAIL

Michael Payne, Chief
Permits and Conservation Division
Office of Protected Resources
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**Re: Taking Marine Mammals Incidental to Marine Seismic Survey in the Beaufort and
Chukchi Seas, Alaska, 77 Fed. Reg. 49,921 (August 17, 2012)**

Dear Mr. Payne:

The undersigned groups submit the following comments on the National Marine Fisheries Service's ("NMFS") August 17, 2012, issuance of a proposed incidental harassment authorization ("IHA") pursuant to the Marine Mammal Protection Act ("MMPA").¹ NMFS proposes to allow the incidental take by Level B harassment of nine marine mammal species and by Level A harassment of three marine mammal species resulting from ION Geophysical's ("ION's") seismic survey activities in the Beaufort and Chukchi seas that are scheduled to begin in October 2012. NMFS should deny ION's application.

ION's proposal is remarkable for both its scope and timing. ION intends to use a survey vessel equipped with a 26-gun array with a total volume of 4,450 cubic inches. Not only is this an incredibly powerful array, but the surveying will take place across a large portion of the Alaskan Beaufort and Chukchi seas, with transect lines of approximately 7,175 kilometers (4,458 miles). The total area of water exposed to sounds greater than or equal to 160 dB will be 209,752 square kilometers. ION will survey for 76 days, beginning in October and lasting into December, when the Arctic is subject to increasing darkness, inclement weather, rough seas, and encroaching ice. As a consequence of the timing, the survey vessel is to be accompanied by an icebreaker, adding further to the disturbance.

¹ A compact disc of the sources cited in this letter has been provided separately to NMFS. NMFS should consider the sources provided on the compact disc in assessing ION's application, and the sources should be included in the administrative record for the IHA decision.

A large seismic airgun array can produce effective peak pressures of sound higher than those of virtually any other man-made source save explosives;² and although airguns are vertically oriented within the water column, horizontal propagation is so significant as to make them, even under present use, one of the leading contributors to low-frequency ambient noise thousands of miles from any given survey.³ Indeed, the enormous scale of this acoustic footprint has now been confirmed by studies of seismic sound in numerous regions around the globe, including the Arctic, the northeast Atlantic, Greenland, and Australia.⁴

This proposed IHA for ION puts vital marine mammal species at risk. It does not represent sound, science-based management of the crucial resources NMFS is charged with overseeing. The proposal is not precautionary, does not utilize the best available science, and would, if finalized, violate the MMPA in the following three ways:

- ION’s proposed survey has the potential to result in “serious injury” by causing permanent hearing loss in marine mammals in clear violation of regulations implementing the MMPA that prohibit the issuance of an IHA for activity that has even the potential to result in serious injury to marine mammals.
- ION’s survey would result in harassment takes of a large number of marine mammals, in violation of the “small numbers” requirement of the MMPA. NMFS proposes to authorize the harassment of over 250 bowhead whales, almost 5,000 beluga whales (12.45% of the population), and over 60,000 seals (24% of the population). These estimates on their own are not small numbers, and it is likely that NMFS has underestimated potential take based on improper threshold and density calculations that do not utilize the best available science.
- ION’s proposed survey has the potential to have more than a negligible impact on populations of marine mammals, in violation of the MMPA. NMFS has underestimated the impacts of stress as well as the impacts of airguns on bowhead whale populations and has not even considered cumulative impacts.

Additionally, there is a great deal of uncertainty regarding population levels of marine mammals expected to be present during the fall and winter season in the Beaufort and Chukchi seas, as well as the long-term biological impacts of sound on those marine mammals. Due to this uncertainty, it is possible that the effects of ION’s proposed surveying could be greater than those assessed in the proposed IHA and could affect far greater numbers of marine mammals than NMFS has estimated in the proposed IHA.

In light of these and other flaws discussed below, NMFS should not, and cannot consistent with the MMPA, issue the IHA as currently proposed.

² See National Research Council (“NRC”), *Ocean Noise and Marine Mammals* (2003).

³ Nieuwkirk, S.L., K.M., Stafford, D.K. Mellinger, R.P. Dziak, and C.G. Fox, Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic Ocean, *Journal of the Acoustical Society of America* 115(4):1832-1843 (2004).

⁴ See discussion, *infra* at Section I(B)(1), related to the 160dB threshold for pulsed sounds.

I. THE PROPOSED AUTHORIZATION DOES NOT COMPLY WITH THE MARINE MAMMAL PROTECTION ACT

NMFS's proposed authorization to ION does not comply with the requirements of the MMPA. Congress enacted the MMPA in 1972 in response to widespread concern that "certain species and population stocks of marine mammals are, or may be, in danger of extinction or depletion as a result of man's activities[.]"⁵ The legislative history states that the purpose of the MMPA is to manage marine mammals "for their benefit and not for the benefit of commercial exploitation."⁶ The primary mechanism by which the MMPA protects marine mammals is through a moratorium on takings.⁷ Under the MMPA, the term "take" is broadly defined to mean "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal."⁸ "Harassment" is further defined to include acts of "torment" or "annoyance" that have the "potential" to injure a marine mammal or marine mammal stock in the wild or have the potential to "disturb" them "by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."⁹

The MMPA provides several narrow exceptions to the moratorium on take. Relevant here, NMFS may, upon request, authorize take in the form of harassment by an IHA for a period of not more than one year, provided certain conditions are met. An activity: (i) must be "specified" and limited to a "specific geographical region," (ii) must result in the incidental take of only "small numbers of marine mammals of a species or population stock," (iii) can have no more than a "negligible impact" on species and stocks, and (iv) cannot have "an unmitigatable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives.¹⁰ In issuing an authorization, NMFS must provide for the monitoring and reporting of such takings and must prescribe methods and means of effecting the "least practicable impact" on the species or stock and its habitat.¹¹ Finally, for an IHA to issue, the activity cannot have the "*potential* to result in serious injury or mortality[.]"¹² As discussed below, NMFS has not demonstrated that the proposed IHA will meet the standards imposed by the MMPA and its governing regulations.

A. NMFS Cannot Issue an IHA Because ION's Activities Have the Potential to Result in Serious Injury of Marine Mammals

The standard for determining whether an IHA is appropriate is exceptionally protective. Generally, IHAs are limited to activities that will result in only the "taking by harassment" of marine mammals.¹³ For those activities that could result in "taking" other than by harassment, interested parties must continue to use the pre-existing procedures for authorization through

⁵ 16 U.S.C. § 1361(1).

⁶ H. R. Rep. No. 92-707, at 11 (1971), reprinted in 1972 U.S.C.C.A.N. 4144, 4154.

⁷ 16 U.S.C. § 1371(a).

⁸ *Id.* §1362(13).

⁹ *Id.* § 1362(18); *see also* 50 C.F.R. § 216.3 (defining "Level A" and "Level B" harassment).

¹⁰ *See* 16 U.S.C. § 1371(a)(5)(D)(i).

¹¹ *Id.* § 1371(a)(5)(D)(ii)(I).

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

¹³ 16 U.S.C. § 1371(a)(5)(D)(i).

specific regulations, often referred to as “five-year regulations.”¹⁴ NMFS’s IHA regulations for the Arctic provide further that an IHA cannot be used for “activities that have the *potential* to result in serious injury or mortality[.]”¹⁵ NMFS has explained that if there is even the possibility of serious injury, NMFS must establish that the “potential for serious injury can be *negated* through mitigation requirements[.]”¹⁶ Otherwise, the applicant must seek authorization through five-year regulations.

Historically, NMFS has employed thresholds of 180dB for cetaceans and 190dB for pinnipeds to estimate take by Level A harassment or injury.¹⁷ As a precautionary measure, NMFS has usually established mitigation requirements to ensure that cetaceans and pinnipeds avoid exposure to these levels of sound by establishing an exclusion zone within the 180/190 dB exposure area.¹⁸ In this instance, ION is proposing to conduct survey activities during the late fall and winter months, under conditions of considerable darkness and ice cover. NMFS has acknowledged that ION’s mitigation measures will not keep marine mammals out of the 180/190dB danger zone. However, rather than denying the IHA, as NMFS should, NMFS attempts to rationalize why, notwithstanding the fact that marine mammals will enter the danger zone, none have the potential to suffer serious injury, and it is appropriate to issue the IHA here.

The rationales NMFS advances in support of this conclusion are flawed, contrary to available evidence, and arbitrary. First, although NMFS admits animals will suffer permanent hearing loss, also termed permanent threshold shift (“PTS”), it concludes, in an unsupported departure from prior practice, that PTS does not constitute serious injury. Second, it asserts that both temporary and permanent hearing loss occur at higher levels of noise than the best available science supports. Third, in another unsupported departure from past practice, it asserts that 90% of the animals that enter the 180/190 dB zones will escape injury because they will not be exposed to sound for long enough or will avoid the loudest sources of noise; but available data undermine those assumptions. ION’s survey and associated activities carry the potential to cause serious injury to marine mammals, and the proposed IHA does not negate the potential for such injury. NMFS’s proposal thus violates the MMPA and its implementing regulations.

¹⁴ See *id.* § 1371(a)(5)(A).

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

¹⁶ 60 Fed. Reg. 28,379, 28,380 (May 31, 1995) (emphasis added).

¹⁷ See, e.g., 77 Fed. Reg. 49,921, 49, 946 (Aug. 17, 2012) (“[I]t is current NMFS practice to estimate take by Level A harassment for received levels above 180 dB re 1µPa (rms) for cetaceans and 190 dB re 1µPa (rms) for pinnipeds.”); 77 Fed. Reg. 25,830, 25,842 (May 1, 2012) (“The distances to received levels of 180 dB and 190 dB re 1 µPa (rms) are mainly relevant as exclusion radii to avoid level A harassment of marine mammals through implementation of shut down and power down measures.”).

¹⁸ *Id.*; see also 77 Fed. Reg. 50,290, 50,313 (Aug. 20, 2012) (“In our 2002 and 2007 rules, we, along with the Navy, based their estimate of take by injury or the significant potential for such take (Level A harassment) on the criterion of 180–dB. We continue to believe this is a scientifically supportable and conservative value for preventing auditory injury or the significant potential for such injury (Level A harassment), as it represents a value less than where the potential onset of a minor temporary threshold shift in hearing might occur based on Schlundt *et al.*’s (2000) research.”).

1. *Permanent Hearing Loss Constitutes Serious Injury for Marine Mammals*

NMFS has recognized in the past that permanent hearing loss or permanent threshold shift in marine mammals should be considered a serious injury. In promulgating the regulations that govern IHAs in the Arctic, NMFS asserted that permanent hearing loss qualifies as serious injury and that activities that cause permanent threshold shift are not appropriate for authorization through an IHA:

Serious injury for marine mammals, such as permanent hearing or eyesight loss, or severe trauma, could lead fairly quickly to the animal's death. . . . [I]f an application indicates that an acoustic source at its maximum output level has the potential to cause a temporary threshold shift in a marine mammal's hearing ability, that taking would constitute a "harassment" take, since the animal's hearing ability would recover and the [IHA] application would be appropriate. However, if the acoustic source at its maximum level had the potential to cause a permanent threshold shift in a marine mammal's hearing ability, that activity would be considered to be capable of causing serious injury to a marine mammal and would therefore *not be appropriate* for an incidental harassment authorization.¹⁹

ION's survey and associated activities carry the potential to cause serious injury to marine mammals through permanent hearing loss.

For its seismic survey, ION proposes using two towed arrays consisting of 26 active airguns with a total discharge volume of 4,450 cubic inches.²⁰ The estimated zero-to-peak source pressure level at 1 meter for each pulse is estimated at 250 dB and the sound exposure level for the full array is estimated to be 229 dB at 1 meter from the source.²¹ In the proposed IHA, NMFS states it is assumed that permanent hearing loss or PTS can occur either from a single exposure at a received sound level higher than that necessary to inflict a temporary threshold shift ("TTS") or by repeated exposure to levels that cause a TTS.²² ION's mitigation and monitoring is designed largely to prevent marine mammals from being exposed to sound levels in excess of 180 dB (for cetaceans) and 190 dB (for pinnipeds) through the use of visual observers, safety zones and ramp up procedures.²³

NMFS acknowledges, correctly, that darkness and ice cover will limit the effectiveness of ION's mitigation and monitoring efforts. Although ION's mitigation measures include the use of night-vision devices ("NVDs") and a thermal imaging (FLIR) camera to assist the monitoring by observers in darkness and poor visibility, NMFS states "NVDs are not nearly as effective as visual observation during daylight hours."²⁴ Further, NMFS adds that both NVDs

¹⁹ 60 Fed. Reg. 28,379, 28,380-81 (emphasis added).

²⁰ 77 Fed. Reg. 49,921, 49,923.

²¹ Request by ION Geophysical for an Incidental Harassment Authorization to Allow the Incidental Take of Marine Mammals during a Marine Seismic Survey in the Arctic Ocean, October-December, 2012, Appendix B at 108 (revised June 2012).

²² 77 Fed. Reg. at 49,928-29; 49,956.

²³ *Id.* at 49,936-37.

²⁴ *Id.* at 49,940.

and FLIR monitoring “remain relatively unproven in regards to their effectiveness under the conditions and i[n] the manner of use planned for this survey.”²⁵ Accordingly, NMFS determined that Level A takes by PTS—takes that cause injury through permanent hearing loss—“*could occur*” “as the proposed monitoring and mitigation measures may not be 100% effective due to ice coverage and long periods of darkness.”²⁶

Rather than denying the application because the potential for permanent threshold shift—and serious injury—cannot be negated here, NMFS proposes to authorize it in this IHA.²⁷ It attempts to justify the decision by downplaying the seriousness of potential injury and stating that the degree of PTS is expected to be “minor” because it would only cause a small amount of hearing loss (“a few dBs of loss at certain frequencies”).²⁸ This assertion—which is unsupported and unexplained—is a dramatic departure from NMFS’s position that permanent hearing loss (of any degree) constitutes “serious injury.” It also directly conflicts with NMFS’s own assessment of the science. In response to comments regarding the taking of marine mammals incidental to Navy activities in 2001, NMFS stated that “It is simply not possible at this time to make a scientific judgment about the severity of different degrees of permanent hearing loss in marine mammals with the present state of scientific knowledge.”²⁹ Similarly, NMFS acknowledged in policy guidance issued this year that uncertainty prevents NMFS from determining what types of noise-related injuries should be considered serious because “NMFS scientists making injury determinations are unlikely to detect noise-related injuries in live animals and because the state of science on identifying noise-related injuries in live marine mammals is still developing.”³⁰

It is undisputed that sound is a fundamental element of the marine environment. Whales, fish, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators—in short, for their survival and reproduction. Scientists recognize that permanent hearing loss can indirectly result in mortality by limiting feeding opportunities and reducing a marine mammal’s ability to detect prey.³¹ No amount of hearing loss is minor for a marine mammal, as NMFS itself has recognized. NMFS must deny ION’s application because the activities have at the very least the potential to result in serious injury.

²⁵ *Id.*

²⁶ *Id.* at 49,946. *See also id.* at 49,956 (acknowledging that PTS may possibly occur as a result of ION’s activity).

²⁷ *Id.*

²⁸ *Id.* at 49,954.

²⁹ 66 Fed. Reg. 22,450, 22,453 (May 4, 2001).

³⁰ NMFS, Guidelines for Distinguishing Serious from Non-Serious Injury of Marine Mammals Pursuant to the Marine Mammal Protection Act at 3 (Jan. 27, 2012).

³¹ Wood, J., B.L. Southall, and D.J. Tollit, PG&E offshore 3-D Seismic Survey Project EIR – Marine Mammal Technical Draft Report. SMRU Ltd. at 24 (2012) (“PG&E Seismic Survey Project”); Marine Mammal Commission (“MMC”), *Marine Mammals and Noise: A Sound Approach to Research and Management* at 13 (March 2007) (“[B]ecause of the importance of sound in the daily lives of marine mammals, even temporary threshold shifts have the potential to increase an animal’s vulnerability to predation, reduce its foraging efficiency, or impede its communication.”); NRC, *Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects* at 31 (2005) (“Changes in hearing threshold, even TTSs, have the potential to affect population vital rates through increased predation or decreased foraging sources of individual animals that experience a TTS as they use sound for these tasks. A TTS also has the potential to decrease the range over which socially significant communication takes place, for example, between competing males, between males and females during mating season, and between mothers and offspring.”).

2. *NMFS Has Not Utilized the Best Available Science to Estimate Temporary and Permanent Hearing Loss Thresholds*

NMFS asserts that animals that enter the 180/190 dB exclusion zone are unlikely to suffer either temporary or permanent hearing loss, and if a marine mammal should suffer temporary or permanent hearing loss, it would only be mild.³² NMFS justifies this reasoning, in part, on studies it claims support significantly higher levels of sound exposure than the 180/190 dB precautionary thresholds.³³

In terms of temporary hearing loss, NMFS cites studies conducted on the temporary threshold shift or TTS thresholds for primarily one species of cetacean, the bottlenose dolphin, which suggest that the exposure level necessary to elicit TTS in bottlenose dolphins may be as high as 210-214 dB for sounds of shorter duration.³⁴ NMFS then jumps to the conclusion that the TTS threshold for *all* species of cetaceans must also be high based on those same studies examining bottlenose dolphins.³⁵ These assumptions, however, are unfounded and contradicted by scientific evidence. A recent study by Lucke et. al. on the TTS thresholds for harbor porpoise using seismic sounds demonstrates that a harbor porpoise experienced TTS when exposed to airgun noise at 164 dB, a significantly lower level than what NMFS predicts.³⁶ The Lucke study demonstrates that TTS thresholds might be significantly different for different species of marine mammals. In fact, there have been no studies on TTS thresholds in baleen whales.³⁷ Thus, NMFS has not justified its shift away from using precautionary measures. NMFS cannot assume that TTS thresholds would be high for all species of marine mammals, or that temporary hearing loss would be unlikely for marine mammals that enter the exclusion zone.

In terms of permanent hearing loss, NMFS estimates that permanent threshold shift or PTS could occur for cetaceans at ~198 dB based on Southall et. al. (2007).³⁸ However, that threshold does not reflect the best available science. A number of recent studies indicate that anthropogenic sound can induce permanent threshold shift at lower levels than anticipated.³⁹ New data indicate that mid-frequency cetaceans, such as bottlenose dolphins and beluga whales, have greater sensitivity to sounds within their best hearing range than was supposed at the time Southall et al. (2007) was published.⁴⁰ It is both conservative and consistent with the methodology of that earlier paper to assume that low-frequency cetaceans, such as bowhead whales, which have never been studied for threshold shift, also have greater sensitivity to sounds

³² 77 Fed. Reg. at 49,927-29.

³³ *Id.* at 49,927.

³⁴ *Id.*

³⁵ *Id.* at 49,927-28.

³⁶ Lucke, K., U. Siebert, P.A. Lepper, and M.A. Blanchet, Temporary shift in masked hearing thresholds in a harbor porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli, *The Journal of the Acoustical Society of America* 125(6):4060-70 (2009).

³⁷ 77 Fed. Reg. at 49,927.

³⁸ *Id.* at 49,929.

³⁹ Kastak, D., J. Mulrow, A. Ghoul, and C. Reichmuth, Noise-induced permanent threshold shift in a harbor seal [abstract], *Journal of the Acoustical Society of America* 123(5):2986 (2008); Kujawa, S.G. and M.C. Liberman, Adding insult to injury: cochlear nerve degeneration after “temporary” noise-induced hearing loss, *Journal of Neuroscience* 29(45):14077-14085 (2009).

⁴⁰ See discussion in PG&E Seismic Survey Project at 46; MMC, Marine Mammals and Noise.

within their own best hearing range.⁴¹ For this reason and others, Dr. Southall and colleagues reduced the threshold shift criteria for baleen whales exposed to airgun noise in the report they recently produced for the California State Lands Commission.⁴² This recent research indicates it is possible marine mammals will experience injury, or potentially serious injury, at lower sound thresholds than NMFS uses in its assumptions.

3. *The Correction Factor NMFS Employs to Estimate the Number of Level A Injury Takes is Arbitrary and Unsupported*

In the proposed IHA, NMFS states that most marine mammals that enter the 180/190 dB exclusion zone during ION's survey will not suffer injury (approximately 90%), and even those 10% of animals that do actually suffer injury will not suffer serious injury. NMFS only estimates 8 total individual animals may potentially suffer Level A injury (4 ringed seals, 3 beluga whales, and 1 bowhead whale). NMFS justifies its conclusion that most animals that enter into the danger zone will remain uninjured on the assertion that marine mammals will naturally avoid airguns when they are operating at full strength. Under NMFS's theory, since marine mammals will not remain in high intensity areas for periods long enough to cause injury and both the vessels and animals are moving, any exposure will only be brief.⁴³

The use of a correction factor to reduce the number of animals in the danger zone that are expected to potentially suffer injury contradicts NMFS's long-standing cautionary approach to auditory impairment, which assumed that any animal entering the 180/190 dB exclusion zone had the potential to suffer injury.⁴⁴ NMFS's justifications for the use of a correction factor—that marine mammals will avoid loud noises and that exposure will only be brief—are both flawed and unsupported by survey data and scientific evidence.

NMFS provides no scientific justification for its assertion that an animal will stay far enough away from an airgun to avoid injury, and available evidence undermines the assertion. Survey data indicate marine mammals, especially ice seals, do not always avoid loud noises. Reports from previous surveys suggest that, despite monitored exclusion zones, marine mammals routinely stray too close to the airguns, even during daylight hours.⁴⁵ In other words,

⁴¹ See PG&E Seismic Survey Project at 46.

⁴² *Id.*

⁴³ See 77 Fed. Reg. at 49,954.

⁴⁴ Moreover, NMFS provides no basis for its quantification of the proportion of animals—90%—that would avoid the potential for injury.

⁴⁵ See, e.g., 77 Fed. Reg. at 49,953-54 (identifying 8 cetaceans sightings in the ≥ 180 dB exclusion zone and 42 observations of seals within the 190 dB zone during seismic surveys in 2007 and 2008); LGL, Marine Mammal Monitoring and Mitigation During Open Water Seismic Exploration by ConocoPhillips Alaska, Inc. in the Chukchi Sea, July-October 2006 at 5-11-5-12 (Jan. 2007) (identifying 50 marine mammals likely exposed to potentially injurious sound levels); LGL, Marine Mammal Monitoring and Mitigation During Open Water Seismic Exploration by Shell Offshore Inc. in the Chukchi and Beaufort Seas, July-September 2006: 90-Day Report at 6-13 (Jan. 2007) (identifying 24 seals likely exposed to potentially injurious sound levels); LGL, Marine Mammal Monitoring and Mitigation During Open Water Seismic Exploration by Shell Offshore Inc. in the Chukchi and Beaufort Seas, July–November 2007: 90-Day Report at 5-43 (Jan. 2008) (identifying 26 sightings of 50 walrus within the exclusion zone); LGL, Marine Mammal Monitoring and Mitigation During Open Water Seismic Exploration by Shell Offshore Inc. in the Chukchi and Beaufort Seas, July–October 2008: 90-Day Report at 7-14 (Jan. 2009) (identifying 44 powerdowns involving 45 marine mammals).

if all marine mammals avoid airguns at distances great enough to eliminate the potential for harm and if ramp up procedures were 100% effective, then the imposition of exclusion zones would not result in the number of shutdowns and powerdowns that are recorded each year. Further, reports from past surveys indicate that there is at least the potential for animals to wander extremely close to an airgun, causing serious injury, especially during the darkness and harsh conditions of winter.⁴⁶ In addition, evidence cited in the previous section demonstrates that marine mammals may suffer temporary or permanent hearing loss at even lower exposure levels than NMFS assumes. A marine mammal, thus, may not need to approach very close to an airgun before it experiences injury or even serious injury.

This is especially true in the case of ringed seals. In the proposed IHA, NMFS expresses concern that ringed seals will likely be attracted to the sounds of the airguns and thus suffer from hearing impairment.⁴⁷ Seals are known to approach survey vessels even in open water, and the attraction of newly opened pathway will likely reinforce this response. Further, seals may have difficulty discerning the source of the noise if disoriented by the sounds of the icebreaker and the proximity of the survey vessel. Under the circumstances, seals could be exposed to multiple blasts at close range, increasing the likelihood they could suffer permanent hearing loss.⁴⁸

For these several reasons, NMFS has both underestimated the degree of hearing loss that marine mammals will potentially suffer as a result of ION's proposed survey as well as the total number of marine mammals that may experience injury or serious injury. In line with the precautionary mandate of the MMPA, until NMFS can establish clear and defensible alternative thresholds, it must estimate Level A takes using the 180/190dB thresholds that it typically employs and recognize that animals entering these exclusion zones have at least the potential to suffer serious injury. Under that assumption, at least 23 beluga whales, 6 bowhead whales, and 277 ringed seals could potentially suffer serious injury as a result of the survey, because, as NMFS acknowledges, they could enter the exclusion zone.⁴⁹ Further, this number may itself be an underestimate, because it is based on an unsupported assumption that 90% of the animals in the survey area will remain far enough away from the survey to avoid the 180/190 dB exclusion zone.

Because NMFS has not negated the possibility of serious injury from ION's proposed seismic surveying, it may not issue an IHA under the MMPA.

⁴⁶ See note 45, *supra*.

⁴⁷ 77 Fed. Reg. at 49,928 (“Pinnipeds occasionally seem to be attracted to operating seismic vessels.”). With regard to ice seals, NMFS stated, “The limited nature of this tendency for avoidance is a concern. It suggests that pinnipeds may not move away, or move very far away, before received levels of sound from an approaching seismic survey vessel approach those that may cause hearing impairment.” *Id.* at 49,926. Nowhere in the proposed IHA does NMFS reconcile its assumption that pinnipeds will avoid airguns with its expressed concern that pinniped behavior precludes this possibility.

⁴⁸ See, e.g., 75 Fed. Reg. at 49,760, 49,793 (Aug. 13, 2010) (noting that “[r]epeated noise exposure that leads to TTS could cause PTS”).

⁴⁹ 77 Fed. Reg. at 49,953-54.

B. The Proposed IHA's Small Numbers Finding is Unjustified

The MMPA prohibits NMFS from authorizing the take of more than “small numbers” of marine mammals.⁵⁰ For the proposed IHA, NMFS estimates close to 5,000 beluga whales and over 60,000 ringed seals would be potentially exposed to sounds at or above 160 dB for pulsed sounds and 120 dB for continuous sounds during ION’s proposed survey.⁵¹ As a result, a large percentage of the beluga whale and ringed seal populations could be affected—close to 5,000 beluga whales or approximately 12.45% of the Beaufort Sea beluga whale population⁵² and 60,000 ringed seals, or approximately 24% of the ringed seal population (as estimated in the proposed IHA). These figures are not either a “small” number of marine mammals nor a “small” proportion of the affected stock. A “definition of ‘small number’ that permits the potential taking of as much as 12% of the population of a species is plainly against Congress’ intent.”⁵³ The proposed authorization, as written, is contrary to the MMPA small numbers limitation.⁵⁴

For beluga whale takes, NMFS does not provide any justification for its conclusion that 12.45% of the beluga whale population represents a small number despite the fact that federal courts have recognized that such a high percentage is more than a small number and NMFS has stated in the past that 12-14% represents a sizeable portion of a stock.⁵⁵

For ringed seals, NMFS concedes in the proposed IHA that 24% of the ringed seal population seems to represent a “large number.”⁵⁶ However, NMFS justifies the large take of ringed seals by concluding, in part, that the impacts are not expected to be “biologically significant,” and that any harassment is expected to be “minor and brief.”⁵⁷ NMFS’s conclusions improperly conflate the analysis for “small numbers” with the analysis for “negligible impact.” As the Ninth Circuit recently confirmed, such conflation violates the plain language of the MMPA.⁵⁸ The court emphasized that “small numbers” and “negligible impact” are two distinct standards that NMFS must independently satisfy when promulgating take authorizations.⁵⁹ Whether, the impacts will be “biologically significant” and whether the harassment will be “minor and brief” is relevant only to “negligible impact” analysis and cannot be used to justify the “small numbers” conclusion for ringed seals.

NMFS also justifies the large take of ringed seals by noting that: (1) population densities for ringed seals were overestimated and the number of ringed seals expected to occur in the

⁵⁰ 16 U.S.C. § 1371(a)(5)(D)(i).

⁵¹ 77 Fed. Reg. at 49,954.

⁵² NMFS uses a smaller number and percentage of beluga whale takes in its analysis based on the assumption that ION will utilize the “preferred alternative” to refuel. *Id.* at 49,954. If ION does not use the “preferred alternative,” NMFS estimates that approximately 5,200 beluga whales or 13.33% of the population will be taken. *Id.*

⁵³ *Natural Res. Def. Council, v. Evans*, 279 F. Supp. 2d 1129, 1152 (N.D. Cal. 2003).

⁵⁴ In 2008, NMFS acknowledged that harassment of 12-14% of western Arctic bowheads represented “a sizeable portion” of the stock. 73 Fed. Reg. 66,106, 66,111 (Nov. 6, 2008).

⁵⁵ *Id.*

⁵⁶ 77 Fed. Reg. at 49,955 (“It may seem that a large number of ringed seals (up to 24.29%) would be taken as a result of the proposed seismic survey activity.”).

⁵⁷ *Id.*

⁵⁸ *Ctr. for Biol. Diversity v. Salazar*, No. 10-35123, 2012 WL 3570667, at *6 (9th Cir. Aug. 21, 2012).

⁵⁹ *Id.* at *10 (“The Service can analyze ‘small numbers’ in relation to the size of the larger population, so long as the ‘negligible impact’ finding remains a distinct, separate standard.”).

project area is much lower; (2) the percentage of unique individuals that would be affected may be inflated because it is likely individual seals will be taken multiple times; and (3) mitigation and monitoring measures are expected to further reduce any potential disturbance.⁶⁰

With regard to the first justification, NMFS has admitted that survey data is not available in order to accurately estimate ringed seal densities. As a result, NMFS has attempted to estimate the greatest potential density, and is even potentially underestimating the number of ringed seals that may be present. NMFS cannot now abandon precaution while evaluating small numbers by stating that *actual* densities are likely to be lower.

With regard to the second justification, NMFS stated in other parts of the proposed IHA that ringed seals will likely not suffer serious injury from loud noises because they will *not* be “taken” multiple times.⁶¹ It is arbitrary for NMFS to state that actual Level B take numbers will be lower because individuals will be taken multiple times, but simultaneously reason that Level A takes will be “less severe” because individuals will not be exposed to loud noises repeatedly.

With regard to the third justification, as noted *supra*, the mitigation measures ION will employ are not 100% effective even in daylight hours. In this instance, ION will be operating in darkness for a large part of the survey, when mitigation measures will be much less effective, as NMFS has recognized. In addition, there are no mitigation measures to prevent marine mammals from entering the 160 dB zone, where Level B takes occur. Therefore, mitigation and monitoring measures will not reduce disturbance.

Overall, the justifications provided by NMFS are not consistent with the statutory standard of the MMPA. Critically, the MMPA definition of harassment is focused on “potential harassment,” which supports the conclusion that all of the animals in a population are harassed “if there is the *potential* for the act to disrupt the behavioral patterns of the most sensitive individual in the group.”⁶²

NMFS’s rationale recognizes the *potential* for a large number of beluga whales and ringed seals to be disturbed.⁶³ The MMPA only allows NMFS to authorize “the incidental, but not intentional, taking by harassment of *small numbers* of marine mammals.”⁶⁴ Thus, even if all the estimated takes do not actually occur, as NMFS proposes in this case, the *potential* for those large takes to occur still exists, and should be included in the analysis of small numbers according to the definition of “harassment.”

⁶⁰ *Id.* at 49,955.

⁶¹ *Id.* at 49,955 (“[T]he probability of an individual pinniped being exposed multiple times is much lower than if the source is stationary.”).

⁶² *Natural Res. Def. Council v. Evans*, 279 F. Supp. 2d at 1157 (emphasis added); *see also* 16 U.S.C. § 1362(18)(A)(ii) (defining harassment to include any act of pursuit, torment, or annoyance that “has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns”).

⁶³ NMFS states, “The estimated Level B behavioral takes proposed to be authorized represent up to 12.45% of the Beaufort Sea population of . . . beluga whales . . . [and] up to 24.29% . . . of U.S. Arctic stocks [of ringed seals].” 77 Fed. Reg. at 49,955.

⁶⁴ 16 U.S.C. § 1371(a)(5)(D) (emphasis added).

It would be arbitrary for NMFS to conclude there is the potential for the incidental taking by harassment of large numbers of marine mammals, but at the same time issue an IHA based on the assumption that only small numbers of marine mammal takes will actually occur. If NMFS can determine there will be fewer takes, it must substantiate its conclusion that only small numbers will be taken and limit its authorization accordingly to ensure that is the case. Trying to have it both ways, by issuing an IHA that allows every possible take, but then skirting the small numbers requirement by asserting take will, in fact, be less, is arbitrary and unlawful.

Further, NMFS has significantly underestimated the Level B takes in the proposed IHA. It is highly likely that even greater numbers of bowhead whales, beluga whales and ringed seals will be subjected to Level B harassment. To estimate take, NMFS multiplied the area exposed to 160 dB for pulsed sounds or 120dB for continuous sound by the expected density of each of the nine marine mammal species expected to be present. Errors at each step, however, result in the proposed IHA underestimating potential numbers of animals taken.

1. *The 160-dB harassment threshold is arbitrary*

The proposed IHA uses a single sound pressure level (160 dB re 1 μ Pa (RMS)) as a threshold for behavioral, sublethal take in all marine mammal species from seismic airguns.⁶⁵ This approach does not reflect the best available science, and the choice of threshold is not sufficiently conservative in several important respects. Indeed, five of the world's leading biologists and bioacousticians working in this field recently characterized the present threshold, in a comment letter to BOEM and NMFS, as "overly simplified, scientifically outdated, and artificially rigid."⁶⁶ NMFS must use a more conservative threshold.

In the first place, the method represents a major step backward from recent programmatic authorizations. For Navy sonar activity, NMFS has incorporated into its analysis linear risk functions that endeavor to take account of risk and individual variability and to reflect the potential for take at relatively low levels.⁶⁷ In the wake of these past authorizations for acoustic impacts on marine mammals, the agency's reversion to a single, non-conservative, bright-line threshold for all species is not tenable.

Furthermore, the 160 dB threshold is non-conservative, since the scientific literature establishes that behavioral disruption can occur at substantially lower received levels for some species. For example, a single seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging – over an area at least 10,000 square nautical miles in size, and can cause baleen whales to abandon habitat over the same scale.⁶⁸ Similarly, a low-frequency, high-amplitude fish mapping device was recently found to silence humpback whales at distance of 200 km, where received levels ranged

⁶⁵ 77 Fed. Reg. at 49,924.

⁶⁶ Clark, C., D. Mann, P. Miller, D. Nowacek, and B. Southall, Comments on Arctic Ocean Draft Environmental Impact Statement at 2 (Feb. 28, 2012); see 40 C.F.R. § 1502.22.

⁶⁷ See, e.g., 74 Fed. Reg. 4844, 4844-4885 (Jan. 27, 2009).

⁶⁸ Clark, C.W. and G.C. Gagnon, Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E9); see also MacLeod, K., M.P. Simmonds, and E. Murray, Abundance of fin (*Balaenoptera physalus*) and sei whales (*B. Borealis*) amid oil exploration and development off northwest Scotland, *Journal of Cetacean Research and Management* 8:247-254 (2006).

from 88 to 110 dB.⁶⁹ Harbor porpoises are known to be acutely sensitive to a range of anthropogenic sources, including airguns. They have been observed to engage in avoidance responses fifty miles from a seismic airgun array – a result that is consistent with both captive and wild animal studies showing them abandoning habitat in response to pulsed sounds at very low received levels, well below 120 dB.⁷⁰ Bowhead whales migrating through the Beaufort Sea have shown almost complete avoidance at airgun received levels at 120-130 dB and below.⁷¹ Beluga whales are highly sensitive to a range of low-frequency and low-frequency dominant anthropogenic sounds, including seismic airgun noise, which has been shown to displace belugas from near-coastal foraging areas out beyond the 130 dB isopleth.⁷² These are merely examples, consistent with the broader literature.

Little if any of these data were available in 1999, when the High Energy Seismic Survey panel issued the report on which the 160 dB threshold is purportedly based,⁷³ since that time, the literature on ocean noise has expanded enormously.

The use of a multi-pulse standard for behavior harassment is also non-conservative, since it does not take into account the spreading of seismic pulses over time beyond a certain distance from the array.⁷⁴ NMFS' own Open Water Panel for the Arctic – which has included some of the country's leading marine bioacousticians – has characterized the seismic airgun array as a mixed impulsive/continuous noise source and has stated that NMFS should evaluate its impacts on that basis.⁷⁵ That analysis is supported by the masking effects model, in which several NMFS scientists have participated and by a number of papers showing that seismic exploration in the Arctic, the east Atlantic, off Greenland, and off Australia has raised ambient noise levels at significant distances from the array.⁷⁶ NMFS cannot ignore this science.

⁶⁹ Risch, D., P.J. Corkeron, W.T. Ellison, and S.M. van Parijs, Changes in humpback whale song occurrence in response to an acoustic source 200 km away, *PLoS ONE* 7(1):e29741 (2012).

⁷⁰ See, e.g., Bain, D.E. and R. Williams, Long-range effects of airgun noise on marine mammals: responses as a function of received sound level and distance (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E35).

⁷¹ Miller, G.W., R.E. Elliot, W.R. Koski, V.D. Moulton, and W.J. Richardson, Whales, in Richardson, W.J. (ed.), *Marine Mammal and Acoustical Monitoring of Western Geophysical's Open-Water Seismic Program in the Alaskan Beaufort Sea, 1998* (1999); Richardson, W.J., G.W. Miller, and C.R. Greene Jr., Displacement of migrating bowhead whales by sounds from seismic surveys in shallow waters of the Beaufort Sea, *Journal of the Acoustical Society of America* 106:2281 (1999).

⁷² Miller, G.W., V.D. Moulton, R.A. Davis, M. Holst, P. Millman, A. MacGillivray, and D. Hannay, Monitoring Seismic Effects on Marine Mammals—Southeastern Beaufort Sea, 2001-2002 at 511-542 (2005).

⁷³ High Energy Seismic Survey Team, High energy seismic survey review process and interim operational guidelines for marine surveys offshore Southern California, prepared for The California State Lands Commission and The U.S. Minerals Management Service, Pacific Outer Continental Shelf Region (Feb. 18, 1999).

⁷⁴ See Expert Panel Review of Monitoring Protocols in Applications for Incidental Harassment Authorizations Related to Oil and Gas Exploration in the Chukchi and Beaufort Seas, 2011: Statoil and ION Geophysical at 4-5 (Mar. 9, 2011) (“Expert Panel Review 2011”).

⁷⁵ *Id.* at 5.

⁷⁶ Gedamke, J., Ocean basin scale loss of whale communication space: potential impacts of a distant seismic survey, Biennial Conference on the Biology of Marine Mammals, November-December 2011, Tampa, FL (2011) (abstract); Nieukirk, S.L., H. Klinck, K. Klinck, D.K. Mellinger, and R.P. Dziak, Seismic airgun sounds and whale vocalization recorded in the Fram Strait and Greenland Sea, Biennial Conference on the Biology of Marine Mammals, November-December 2011, Tampa, FL (2011) (abstract); Nieukirk, S.L., D.K. Mellinger, S.E. Moore, K. Klinck, R.P. Dziak, and J. Goslin, Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999-2009, *Journal of the Acoustical Society of America* 131(2):1102-1112 (2012); Nieukirk, S.L., K.M. Stafford, D.K. Mellinger, R.P. Dziak, and C.G. Fox, Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic

Finally, the threshold's basis in the root mean square ("RMS") of sound pressure, rather than in peak pressure, is non-conservative. Studies have criticized the use of RMS for seismic sound because of the degree to which pulsed sounds must be "stretched," resulting in significant potential underestimates of marine mammal take.⁷⁷

If NMFS would modify its threshold estimates, as it must based on the best available science, the estimated number of marine mammal takes could be significantly higher than the number of marine mammal takes NMFS has already predicted.

2. *The density calculations do not account for the migration of whales*

The proposed IHA's use of a "density" measure in determining take during the bowhead migration is inappropriate. In the Beaufort Sea, NMFS has repeatedly found that using density is unsuited for determining bowhead take during the fall migration.⁷⁸ Measuring potential harassment using a density approach assumes that animals remain relatively stationary from one day to the next, but this assumption is inapplicable for surveying that will take place within a migratory corridor. The proposed IHA does not indicate the rationale for using an approach that ignores the fact that bowhead whales will pass through the Beaufort and Chukchi seas in the fall. Nor is it clear that NMFS adequately considered the migration of beluga whales in the Beaufort Sea and whether a density approach in that instance is equally inappropriate. Properly taking the bowhead migration into account, along with an appropriate sound threshold for harassment, could dramatically increase the estimate of harassed whales.

Therefore, not only does NMFS facially authorize takes that exceed the "small numbers" requirements of the MMPA, it also underestimates total takes. A more correct estimate would increase the number of marine mammal takes even further. The proposed IHA is thus unlawful because it does not meet the "small numbers" requirement of the MMPA.

C. The proposed IHA's finding of negligible impact is unjustified

A "negligible impact" is defined as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."⁷⁹ NMFS must base its determination of negligible impact on the "best available scientific evidence."⁸⁰ In *Brower v. Evans*, the Ninth Circuit found that ESA caselaw "provides insightful and analogous provisions and analysis" when considering a best available science requirement.⁸¹ The court has invoked the ESA's best available science standard to require that agencies give the "benefit of the

Ocean, *Journal of the Acoustical Society of America* 115(4):1832-1843 (2004); Roth, E.H., J.A. Hildebrand, S.M. Wiggins, and D. Ross, Underwater ambient noise on the Chukchi Sea continental slope, *Journal of the Acoustical Society of America* 131(1):104-110 (2012).

⁷⁷ Madsen, P.T., Marine mammals and noise: Problems with root-mean-squared sound pressure level for transients, *Journal of the Acoustical Society of America* 117(6):3952-57 (2005).

⁷⁸ See, e.g., 76 Fed. Reg. 68,974, 69,009 (Nov. 7, 2011); 73 Fed. Reg. 66,106, 66,115 (Nov. 6, 2008).

⁷⁹ 50 C.F.R. § 216.103.

⁸⁰ *Id.* §§ 216.104(c); 216.102(a).

⁸¹ 257 F.3d 1058, 1070 (9th Cir. 2001).

doubt” to the species.⁸²

NMFS has not fully considered the potential impacts on marine mammals because it ignores impacts of stress, underestimates impacts on bowhead whales, and neglects to conduct a cumulative impacts analysis.

I. Stress can harm marine mammals

At high levels, anthropogenic noise can cause temporary or permanent hearing damage to marine mammals. This, however, is not the only source of potential harm. Marine mammals can also suffer long-term impacts attributable to exposure to lower levels of noise.

Noise exposure is likely to result in stress, and stress can impair an animal’s immune system.⁸³ Stress can occur even in the absence of any behavioral change or exclusion from habitat. The consequences will depend on the duration of exposure, population condition, and other factors like exposure to pathogens and immunosuppressing compounds. Indeed, the Navy has conservatively assumed in its EISs for active sonar training that any effect sufficient to cause hearing loss or produce a behavioral response sufficient to cause take under the MMPA will also produce a stress-response and contribute to a marine mammal’s allostatic load.⁸⁴ A recent New England Aquarium study of North Atlantic right whales, the closest relative of the bowhead whale, indicates that shipping noise alone can induce chronic stress in marine mammals.⁸⁵

NMFS, while acknowledging the potential for chronic stress to significantly affect marine mammal health, and while expecting that anthropogenic noise would induce physiological stress responses in marine mammals, does not incorporate chronic stress into its impact analysis because it assumes that marine mammals will avoid seismic vessels and the duration of exposure will be brief.⁸⁶ NMFS has too quickly eliminated stress from consideration, especially considering the cumulative stress impacts that will result given that ION’s proposed survey will impact the same bowhead fall migration population that will be affected by Shell’s plans for exploratory drilling west of Camden Bay.

⁸² *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1988) (quoting H.R. Conf. Rep. No. 96-697, at 12 (1979), reprinted in 1979 U.S.C.C.A.N. 2572, 2576).

⁸³ Wright, A.J. et al., Do Marine Mammals Experience Stress Related to Anthropogenic Noise?, *International Journal of Comparative Psychology* 20(2):274-316 (2007); Romano, T.A., M.J. Keogh, C. Kelly., P. Feng, L. Berk, C.E. Schlundt, D.A. Carder, and J. Finneran, Anthropogenic Sound and Marine Mammal Health: Measures of the Nervous and Immune Systems Before and After Intense Sound Exposure, *Canadian Journal of Fisheries and Aquatic Sciences* 61:1124–1134 (2004).

⁸⁴ See e.g., U.S. Navy, Southern California Range Complex: Final Environmental Impact Statement/ Overseas Environmental Impact Statement at 3.9-102 (2008).

⁸⁵ Rolland, R.M., S.E. Parks, K.E. Hunt, M. Castellote, P.J. Corkeron, D.P. Nowacek, S.K. Wasser, and S.D. Kraus, Evidence that ship noise increases stress in right whales, *Proceedings of the Royal Society B: Biological Sciences* doi:10.1098/rspb.2011.2429 (2012).

⁸⁶ 77 Fed. Reg. at 49,929-30.

2. *NMFS underestimates impacts on bowhead whales*

NMFS must address the fact that “in mid to late October and November substantial numbers of bowheads likely still will be in the Beaufort Sea including near Barrow, which is an important feeding area.”⁸⁷ The proposed IHA makes only passing mention of feeding, asserting that the surveying will take place “after most” bowheads have migrated out of the project area.⁸⁸ NMFS must more thoroughly analyze impacts on bowhead feeding activities in its impact conclusions.

NMFS should also require that ION provide additional clarification about the location and timing of its surveying. The proposed IHA describes the surveying as beginning in deeper waters (> 1,000m) in the eastern half of the survey area before moving to the west in late October or early November.⁸⁹ It maintains that ION will first survey in the deep water area of the northwestern Beaufort before moving toward shore in order to avoid migrating bowhead whales.⁹⁰ However, as indicated above, bowhead migration has the potential to extend into late October and even November. Given the importance of the issue for bowheads, NMFS must specify the earliest date at which ION may survey in more shallow waters near the migration corridor, and include the specific timing of ION’s operations in its conclusions and recommendations.

NMFS does not fully consider the impacts of ION’s survey on migrating bowhead whale mother and calf pairs. Cows and calves are known to favor the tail end of the spring and fall migrations.⁹¹ Females with calves are considered to be more susceptible to noise disturbances, and NMFS must at least evaluate the necessity of additional mitigation to protect this vulnerable segment of the population.⁹² As other agencies have recognized in the past, the potential effects of noise on females and calves merit “special consideration.”⁹³ In the past, NMFS has implemented mitigation measures specifically to protect mothers and calves. In 2006, NMFS required a 120-dB safety zone for 4 or more cow-calf pairs to reduce impacts from Arctic seismic operations.⁹⁴ ION’s proposed survey will likely have the greatest impacts on mother-calf

⁸⁷ Expert Panel Review of Monitoring and Mitigation Protocols in Applications for Incidental Take Authorizations Related to Oil and Gas Exploration, Including Seismic Surveys, in the Chukchi and Beaufort Seas at 12 (March 2010) (“Expert Panel Review 2010”).

⁸⁸ 77 Fed. Reg. at 49,933.

⁸⁹ *Id.* at 49,923.

⁹⁰ *Id.*

⁹¹ NMFS, Biological Opinion for the Authorization of Small Takes Under the Marine Mammal Protection Act for certain Oil and Gas Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska for 2010 at 19, 21 (July 13, 2010) (In the spring, the “last whales to pass Barrow tend to be females that are accompanied by calves[.]”); “Eskimo whalers report that smaller whales precede large adults and cow-calf pairs on the fall migration.”); 76 Fed. Reg. 68,974, 69,020 (Nov. 7, 2011) (“Cow/calf pairs typically migrate through the area later in the season (i.e., late September/October[.]”).

⁹² NMFS, Biological Opinion for Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the Marine Mammal Protection Act at 86 (July 17, 2008) (“2008 BiOp”) (in other mammal species, including cetaceans, “females with young are more responsive to noise and human disturbance than other segments of the population”).

⁹³ *See, e.g.*, Minerals Management Service, Final Programmatic Environmental Assessment, Arctic Ocean Outer Continental Shelf Seismic Surveys – 2006 (OCS EIS/EA 2006-038) at 110-111 (June 2006) (PEA).

⁹⁴ *See* 71 Fed. Reg. 66,912, 66,913 (Nov. 17, 2006) (noting that the 120-dB requirement was “essential” to NMFS’s finding of no significant impact).

pairs because they typically migrate “later in the season.” NMFS needs to consider these significant biological impacts in its “negligible impacts” analysis. The proposed IHA’s failure to adequately address these concerns undermines its conclusions as to the degree of impact that ION’s proposal will have on bowhead whales.

3. *The effects of other activities in the Arctic combined with ION’s surveying may harm marine mammals*

NMFS cannot ensure that permitted activities will have no more than negligible impacts on the stocks of marine mammals without looking at all of the oil activities scheduled to take place in the Arctic Ocean. As a result of its failure to look beyond ION’s proposed activities, NMFS understates the potential effect on marine mammals. Although NMFS has resisted considering cumulative effects in the past, the plain language of the MMPA’s incidental take provisions requires affirmative findings that the resulting effects of authorized takings will have no more than “negligible” effects on marine mammals and no “unmitigable adverse impact” on subsistence uses.⁹⁵ Further, NMFS’s implementing regulations recognize the need to consider cumulative effects under some circumstances. An incidental harassment authorization should be revoked if the authorized takings “individually or in combination with other authorizations” are having a more than negligible impact on the population or an unmitigable adverse impact on subsistence.⁹⁶ As a practical matter, if NMFS ignores all additional sources of noise and disturbance, its MMPA determinations will lack a rational basis. This is especially true given that NMFS has cautioned that multiple exploration activities (seismic surveying, ice management, drilling) can create a biologically significant risk to marine mammals.⁹⁷

According to NMFS’s Alaska Stock Assessment Report, the “accumulation of impacts from vessels, seismic exploration, and drilling are of concern across the North Slope of Alaska.”⁹⁸ The National Research Council has advised agencies to assess cumulative effects to the population from multiple effects to multiple individuals:

At the individual level, the biological significance of an effect must be judged by changes in the ability of an animal to grow, survive, and reproduce. The population effect involves the cumulative impact on all individuals affected. . . . Population consequences of behavioral change result from the accumulation of responses of individuals.⁹⁹

The scientific review panel created for the Open Water Meeting has urged that there is a need “for better analysis of the potentially interacting influences of multiple oil and gas activities co-

⁹⁵ 16 U.S.C. § 1371(a)(5)(D)(i).

⁹⁶ 50 C.F.R. § 216.107(f)(2).

⁹⁷ See, e.g., 2008 BiOp at 86.

⁹⁸ Allen, B. M. and R. P Angliss, *Alaska Marine Mammal Stock Assessments, 2011*, U.S. Dep’t Commerce, NOAA Technical Mem., NMFS-AFSC-234 at 214 (May 2012).

⁹⁹ NRC, *Marine Mammal Populations and Ocean Noise* at 19-20.

occurring in time and space[.]”¹⁰⁰ Courts have sensibly applied the same principle in other contexts when confronted with an agency’s failure to evaluate the effects of multiple activities.¹⁰¹

It is essential that NMFS consider ION’s proposed surveying along with the impacts of Shell’s related proposal to conduct exploratory drilling in the Beaufort and Chukchi seas.¹⁰² Shell’s drilling could deflect substantial numbers of migrating whales away from important feeding grounds.¹⁰³ ION’s surveying would further stress the population.

Moreover, scientists have recognized that the potential impacts of sequential activities must be assessed in order to determine whether impacts from any activity will be negligible.¹⁰⁴ Both ConocoPhillips and Statoil have indicated that they are preparing for exploratory drilling in the Chukchi Sea in the coming years, which – combined with Shell’s efforts – could result in three drilling operations in close proximity to one another.¹⁰⁵ The State of Alaska recently expressed a strong interest in exploiting oil and gas reservoirs that can be accessed in state waters.¹⁰⁶ The State’s decision could prompt seismic surveying as companies determine potential locations for exploration. NMFS must also determine what industrial activities are planned in Canadian and Russian waters for 2012 and beyond. These activities, when viewed in combination, have the potential to impact marine mammals multiple times over a much greater time-scale.¹⁰⁷

NMFS cannot accurately assess the potential for harm from ION’s proposed marine mammal harassment without considering effects in the context of these other activities occurring throughout the Arctic. Without taking this into account, NMFS’s negligible impact conclusions are inaccurate.

¹⁰⁰ Expert Panel Review 2010 at 9; *see also* Expert Panel Review 2011. The issue is also discussed extensively in the recent USGS report on the Arctic, *infra* note 9.

¹⁰¹ *See Or. Natural Res. Council Fund v. Goodman*, 505 F.3d 884, 893 (9th Cir. 2007) (“A particular action may seem unimportant in isolation, but that small action may have dire consequences when combined with other actions.”).

¹⁰² The effects of the marine mammal harassment associated with Shell’s drilling plans in the Beaufort and Chukchi Seas are detailed in the final IHAs issued in association with those activities. 77 Fed. Reg. 27,284 (May 9, 2012); 77 Fed. Reg. 27,322 (May 9, 2012).

¹⁰³ NMFS notes that Shell’s drilling activities could exclude bowhead whales from the important Camden Bay feeding area and may result in extra energy expenditure in order to find alternate feeding grounds. 77 Fed. Reg. 27,284, 27,314.

¹⁰⁴ *See* Clark, C., D. Mann, P. Miller, D. Nowacek, and B. Southall, Comments on Arctic Ocean Draft Environmental Impact Statement at 1-2 (Feb. 28, 2012); *see* 40 C.F.R. § 1502.22 (comments to agency on draft programmatic EIS which states there needs to be an adequate assessment of sequential oil and gas activities and their potential impacts in any negligible impact analysis); *supra* n. 99.

¹⁰⁵ ConocoPhillips has already submitted its exploration plan to BOEM. *See* http://alaska.boemre.gov/ref/ProjectHistory/2011_Chukchi_COP/draftEP/draftEPx.HTM.

¹⁰⁶ Alaska Governor Plans to Open Coast for Drilling, <http://fuelfix.com/blog/2011/06/30/alaska-governor-plans-to-open-coast-for-drilling/> (June 30, 2011); Press Release, Governor Parnell Lauds Successful Lease Sale (Dec. 7, 2011), *available at* <http://gov.alaska.gov/parnell/press-room/full-press-release.html?pr=5982>.

¹⁰⁷ NRC, *Marine Mammal Populations and Ocean Noise* at 20 (“Population consequences of behavioral change result from the accumulation of responses of individuals. In some cases, thousands of behavioral effects accumulated over years may be necessary for any population consequences; in other cases, a single instance of behavioral response may have the potential for population consequences.”).

D. Uncertainty Precludes Conclusions Regarding Potential Impacts

In determining whether to proceed with ION's request, NMFS must also consider the extent of missing information as to both the environmental baseline in the Arctic and marine mammal responses to noise in general. Both counsel in favor of extreme caution in implementing NMFS's statutory responsibilities.¹⁰⁸

NMFS itself has recognized that data "to describe marine mammals and their habitat" in the Arctic "are lacking or inadequate to support impact assessment and mitigation planning."¹⁰⁹ Moreover, there "are gaps in our understanding of the biological significance of exposure to various levels of both continuous and impulsive oil and gas activity sounds."¹¹⁰ These same observations have been echoed by others.¹¹¹ Most recently, the USGS found that baseline data for many marine mammal species in the Arctic are still needed, including information on current abundance, seasonal distribution, movements, population dynamics, foraging areas, sea-ice habitat relationships, and age-specific vital rates.¹¹² The need for this baseline information is apparent even for bowhead whales, one of the better studied species in the Arctic.¹¹³ The report confirms that more research is also necessary to accurately assess marine mammal reactions to different types of noise and that more work is needed to characterize the seasonal and spatial levels of ambient noise in both the Beaufort and Chukchi seas.¹¹⁴

In the proposed IHA, NMFS has recognized the abundant lack of information on marine mammals and their activities during the fall and winter months, when ION's proposed activities would be occurring. In the Federal Register notice, NMFS granted that "few data (systematic or

¹⁰⁸ In fact, the passage of the MMPA was driven in part by a lack of adequate information about marine mammals. 16 U.S.C. § 1361(3) (noting that there is "inadequate knowledge" of marine mammals). *See also* Dr. Jane Lubchenco, Keynote Speech, Arctic Symposium (June 20, 2011) (stating "when in doubt, err on the side of caution"), *available at* http://www.noaa.gov/stories/2011/20110620_arcticice.html.

¹⁰⁹ NMFS, Comments on Minerals Management Service Draft Environmental Impact Statement for the Beaufort Sea and Chukchi Sea Planning Areas – Oil and Gas Lease Sales 209, 212, 217, and 221 at 3 (March 27, 2009) ("NMFS Multi-Sale Cmts.").

¹¹⁰ National Oceanic and Atmospheric Administration, Comments on the U.S. Department of the Interior/MMS Draft Proposed Outer Continental Shelf (OCS) Oil and Gas Leasing Program for 2010-2015 at 9 (Sept. 21, 2009).

¹¹¹ *See, e.g.*, Joint Subcommittee on Ocean Science & Technology, Addressing the Effects of Human-Generated Sound on Marine Life: An Integrated Research Plan for U.S. Federal Agencies at 3 (Jan. 13, 2009) (stating that the current status of science as to noise effects "often results in estimates of potential adverse impacts that contain a high degree of uncertainty"); *id.* at 62-63 (noting the need for baseline information, particularly for Arctic marine species); Nat'l Comm'n on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (Nat'l Commission), *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling*, Report to the President at vii (January 2011) (finding that "[s]cientific understanding of environmental conditions in sensitive environments . . . in areas proposed for more drilling, such as the Arctic, is inadequate"); Nat'l Comm'n, *Offshore Drilling in the Arctic: Background and Issues for the Future Consideration of Oil and Gas Activities*, Staff Working Paper No. 13 at 19 (finding "basic stock assessments and baseline data on Arctic marine mammal abundance, trends in abundance, stock structure, and distribution are inadequate" and listing acoustics research on impacts to marine mammals as a "high priority").

¹¹² United States Geological Survey, *An Evaluation of the Science Needs to Inform Decisions on Outer Continental Shelf Energy Development in the Chukchi and Beaufort Seas, Alaska*, Circular 1370 at 59, 179 (2011) ("USGS Report"), *available at* <http://pubs.usgs.gov/circ/1370/>. The proposed IHA does not refer to the USGS findings.

¹¹³ USGS Report at 52, 179-182.

¹¹⁴ *Id.* at 176.

otherwise) are available on the distribution and numbers of marine mammals during the early winter period of this survey, particularly in the Beaufort Sea.”¹¹⁵

NMFS skirts the uncertainty associated with its conclusions by remarking that marine mammal population sizes and densities appear to be increasing in the face of past oil and gas activity.¹¹⁶ Thus, NMFS concludes, there will probably not be any long-term population effects associated with ION’s activities. However, the MMPA is precautionary. NMFS should not wait for detrimental effects to occur before taking action, but rather, should wait to authorize the harassment of marine mammals until the best available science demonstrates seismic surveys, like the one ION is proposing, will not result in long-term biological effects.

More pointedly, NMFS has warned that, without better data, it is difficult to make the findings that are legally required to authorize marine mammal harassment.¹¹⁷ We agree. The lack of adequate information precludes NMFS from ensuring compliance with the demanding standards of the MMPA and should compel NMFS to defer oil and gas-related marine mammal harassment authorizations, particularly for large-scale activities like those ION proposes, while the necessary information is gathered.

II. COMPLIANCE WITH OTHER LAWS

A. National Environmental Policy Act

NMFS indicates that it is preparing an environmental assessment pursuant to the National Environmental Policy Act (“NEPA”) but makes no mention of its long-standing effort to develop a programmatic review of oil and gas exploration.¹¹⁸ In 2006, NMFS acknowledged the potential for cumulative, longer-term impacts to marine mammals resulting from expanded oil and gas activity in the Arctic. As a consequence, NMFS and BOEM’s predecessor committed to address the issue, in part, by preparing a programmatic environmental impact statement (“PEIS”) in order to assess seismic survey permitting throughout the Beaufort and Chukchi seas.¹¹⁹ That effort resulted in a 2009 draft PEIS, but before it was finalized, the agencies announced that additional information had become available, in particular, “renewed interest in exploratory drilling in both the Chukchi and Beaufort seas[.]”¹²⁰ A new process was then initiated with NMFS announcing in 2010 its intent to prepare a PEIS to analyze the environmental impacts of issuing take authorizations incidental to all exploration activities, including both seismic surveys and exploratory drilling.¹²¹ Although NMFS released a Draft PEIS in December of 2011, NMFS has most recently announced the further delay of a final PEIS because more analysis is needed to

¹¹⁵ 77 Fed. Reg. at 49,921.

¹¹⁶ See, e.g., *id.* at 49,954.

¹¹⁷ NMFS Multi-Sale Cmts. at 3-5.

¹¹⁸ 77 Fed. Reg. at 49,961.

¹¹⁹ 71 Fed. Reg. 66,912 (Nov. 17, 2006).

¹²⁰ 74 Fed. Reg. 55,539 (Oct. 28, 2009).

¹²¹ 75 Fed. Reg. 6,175 (Feb. 8, 2010).

cover a broader range of exploratory drilling activities.¹²² NMFS expects to finalize the PEIS in 2014.¹²³

As our groups have repeatedly brought to NMFS's attention¹²⁴, NEPA regulations make clear that agencies should not proceed with authorizations for individual projects like the ION proposal until an ongoing programmatic EIS is complete.¹²⁵ ION's plans are broad in scope, including both seismic surveys and likely some degree of ice breaking and management. It would be unlawful for NMFS to approve the marine mammal harassment associated with ION's proposal without completing the EIS. Only by evaluating as a whole the cumulative, long-term impacts of noise associated with expanding levels of seismic exploration and exploratory drilling can the full and potentially synergistic effects of the various individual projects be understood and adequately protective mitigation measures put in place.¹²⁶ If the agency does go forward with the permitting before the completion of the ongoing PEIS process, it should prepare an EIS for the ION activity given the potential for the surveying to cause significant environmental impacts.

B. Endangered Species Act

The proposed IHA indicates that NMFS has initiated self-consultation for the bowhead whale.¹²⁷ NMFS, however, should not overlook bearded and ringed seals in its consultation. Portions of their populations have been proposed for listing, and those decisions will likely be finalized before ION proposes to begin its survey program.¹²⁸

¹²² Update: Draft Programmatic EIS Concerning Effects of Oil and Gas Activities in the Arctic Ocean, available at http://www.nmfs.noaa.gov/pr/permits/eis/arctic_statement2012.pdf.

¹²³ *Id.*

¹²⁴ See, e.g., Alaska Wilderness League, et. al., Comments on Open Water Marine Survey Program in the Chukchi Sea, Alaska During 2009-2010 at 2-3 (July 1, 2009).

¹²⁵ See 40 C.F.R. § 1506.1(c).

¹²⁶ The EIS may also illuminate issues such as necessary mitigation measures and important time and place restrictions.

¹²⁷ 77 Fed. Reg. at 49,961.

¹²⁸ See 76 Fed. Reg. 77,466 (Dec. 13, 2011) (ringed); 76 Fed. Reg. 77,465 (Dec. 13, 2011) (bearded).

The IHA that NMFS is proposing to issue to ION threatens critical marine mammal stocks in the Beaufort and Chukchi seas in violation of the MMPA. As documented in the Federal Register notice, ION's activities have the potential to cause serious injury to marine mammals, will take far more than "small numbers" of marine mammals, and will have more than a negligible impact on the populations of marine mammals in the Arctic. For these reasons, NMFS should deny ION's IHA request.

Respectfully,

Leah Donahey
Western Arctic and Oceans Program Director
ALASKA WILDERNESS LEAGUE

Eric F. Myers
Policy Director
AUDUBON ALASKA

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MARINE MAMMAL COMMISSION

21 September 2012

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

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application from ION Geophysical (ION), seeking an incidental harassment authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act. The authorization would be to take small numbers of marine mammals by harassment incidental to a seismic survey in the Alaskan Beaufort and Chukchi Seas between October and December 2012. The Commission also has reviewed the National Marine Fisheries Service's 17 August 2012 notice (77 Fed. Reg. 49922) announcing receipt of the application and proposing to issue the authorization, subject to certain conditions.

RECOMMENDATIONS

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

- continue to include proposed incidental harassment authorization language, including the total number of estimated takes by Level A and Level B harassment, at the end of *Federal Register* notices but ensure that the language is consistent with that referenced in the main body of the corresponding notice;
- propose to issue regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act and a letter of authorization, rather than an incidental harassment authorization, for any proposed activities expected to cause a permanent threshold shift;
- require ION to (1) consult with the Service's National Marine Mammal Laboratory and other researchers and revise its expected density estimates for gray whales and bearded seals to reflect new information from passive acoustic recordings, and (2) include, as appropriate, an estimate of takes by Level A harassment for those species;
- require ION to recalculate expected densities for bowhead whales based on (1) the corrected decrease in abundance of bowhead whales reported by Miller et al. (2002) for early and late October (i.e., 78 percent) and (2) any additional information from more recent surveys, including acoustical surveys, conducted by the Service's National Marine Mammal Laboratory and other researchers to assess the distribution and relative abundance of bowhead whales in the survey area from October through December;
- provide stronger assurance that the actual number of takes would be negligible by (1) estimating the expected number of takes plus some measure of uncertainty in that estimate, (2) using maximum estimated densities of the marine mammals in the survey area to estimate

- takes, or (3) using some comparable approach that accounts for uncertainty and provides a high level of assurance that the actual taking would, in fact, be negligible;
- require ION to (1) revise the estimated number of Level A harassment takes to include all marine mammals that may be exposed to source levels greater than or equal to 180 and 190 dB re 1 μ Pa (for cetaceans and pinnipeds, respectively), (2) account for all sources of uncertainty in its estimation approach, including animals that may be present but not observed, (3) provide a scientific basis for any conclusions about the animals' responses to the airguns, and (4) base its negligible impact determination on the revised estimated number of Level A harassment takes;
 - require ION to (1) record, analyze, and report (within five days of collecting the data) the results of measurements of vessel sounds, including the icebreaking vessel and (2) adjust the size of the 120-dB re 1 μ Pa harassment zone and revise the estimated number of animals expected to be taken by Level B harassment for all icebreaking activities, as necessary;
 - require ION to use passive and active acoustic monitoring, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound;
 - specify reduced vessel speeds of 9 knots or less when in transit and 5 knots or less when weather conditions or darkness reduce visibility; and
 - require ION to establish and monitor adequately both a 160- and a 120-dB re 1 μ Pa disturbance zone around all sound sources and to not initiate or continue an activity if (1) an aggregation of bowhead whales or gray whales (12 or more whales of any age/sex class that appear to be engaged in a non-migratory, significant biological behavior (e.g., feeding, socializing)) is observed within the 160-dB re 1 μ Pa zone, or (2) a female-calf pair is observed within the 120-dB re 1 μ Pa zone.

RATIONALE

ION has proposed to conduct a seismic reflection/refraction survey in the Alaskan Beaufort and northeastern Chukchi Seas between October and December 2012 when sea ice is forming. The survey would consist of 7,175 km of transect lines in water less than 20 to 3,500 m deep over the continental shelf. ION would use one main source vessel and one icebreaking vessel. The source vessel would tow a 28-airgun array at 8.5 m in depth. The array would have a total discharge volume of 4,450 in³ and an estimated source level of 232 dB re 1 μ Pa (rms). ION also would tow a hydrophone streamer up to 9 km in length to collect the seismic data. In addition, it would use an icebreaker travelling up to 1.0 km ahead of the source vessel to break and clear ice; the source level of the icebreaker in first year ice is unknown but expected to be less than 200 dB re 1 μ Pa (rms). Both vessels would use 30 to 200 kHz echo sounders continuously to measure water depth while underway. Source levels for the echo sounders typically range from 188 to 200 dB re 1 μ Pa at 1 m.

The Service preliminarily has determined that the proposed activities could result in Level A harassment of small numbers of up to three marine mammal species or stocks and Level B

harassment of small numbers of those same three plus six other marine mammal species or stocks. However, the Service believes that the total taking would have a negligible impact on each of the affected species or stocks. The Service does not anticipate any taking of marine mammals by death or serious injury, and also believes that the potential impacts on the species/stocks and their habitat would be the least practicable because of the proposed mitigation and monitoring measures. Those measures include—

- (1) conducting in-situ sound propagation measurements for the airgun array and mitigation airgun at the beginning of the survey at representative depths (weather permitting) and adjusting the respective Level A and Level B harassment zones, as necessary;
- (2) recording ambient sounds and sounds generated by the vessels (including icebreaking activities) once every hour for approximately 54 seconds;
- (3) using three trained, Service-approved, and vessel-based observers on the seismic source vessel to monitor the exclusion and disturbance zones (i.e., Level A and Level B harassment zones, respectively) during daylight hours throughout the entire survey;
- (4) using three trained, Service-approved, and vessel-based observers on the icebreaker to provide advance notice of marine mammals to the observers on the source vessel;
- (5) using ramp-up, power-down, and shut-down procedures;
- (6) prohibiting ramp-up procedures from a cold start if the entire exclusion zone is not visible;
- (7) prohibiting the practice of continuous firing of only one airgun (i.e., the “mitigation gun”) during extended maintenance (greater than one hour), long transits, and for long periods of time during darkness or other periods of poor visibility;
- (8) monitoring pinnipeds hauled out on ice within the exclusion zone and implementing power-down procedures if an animal enters the water within that zone;
- (9) altering the vessels’ speed and/or direction, if feasible, when a marine mammal in the water is detected outside the exclusion zone but is likely to enter that zone;
- (10) operating vessels in ways that avoid groups of whales and conducting activities at the maximum distance possible from those groups;
- (11) operating transiting vessels at speeds necessary to limit physical contact with whales;
- (12) avoiding potential interactions within 1.6 km of a bowhead whale by (a) reducing vessel speed to five knots or less within 274 m of the whale, (b) steering around it if possible, (c) operating the vessel in a way that does not separate members of a whale group and avoids causing a whale to make multiple changes in direction, and (d) checking the water immediately adjacent to the vessel to ensure that no whales would be injured if the propellers were engaged;
- (13) reducing vessel speed when weather conditions diminish visibility;
- (14) limiting aircraft overflights to an altitude of no less than 305 m when within 0.5 km of a group of whales;
- (15) restricting aircraft from hovering or circling above or within 0.5 km of a group of whales;
- (16) collaborating with other industry operators to deploy and retrieve acoustic recorders in the Alaskan Beaufort Sea to characterize seismic sounds and marine mammal vocalizations during fall and winter 2012/2013;

- (17) reporting injured and dead marine mammals to the Service and the local stranding network using the Service's phased approach and suspending activities, if appropriate; and
- (18) submitting field and technical reports and a final comprehensive report to the Service.

The Commission commends the Service for its inclusion of the draft incidental harassment authorization at the end of the *Federal Register* notice, as it clarifies the Service's proposed authorization. However, some of the measures outlined in that section differ from those described in the main body of the *Federal Register* notice. The Service has clarified subsequently that the above measures are correct and would be required by the final authorization. Additionally, the total number of estimated takes by Level B harassment (i.e., from the seismic survey and refueling) was not specified. The Marine Mammal Commission recommends that, in the future, the National Marine Fisheries Service continue to include proposed incidental harassment authorization language, including the total number of estimated takes by Level A and Level B harassment, at the end of *Federal Register* notices but ensure that the language is consistent with that referenced in the main body of the corresponding notice.

Availability of marine mammals for subsistence

ION has signed a conflict avoidance agreement with the Alaska Eskimo Whaling Commission and the Whaling Captains' Associations of 11 North Slope communities. It also has developed a plan of cooperation identifying the measures it would implement to minimize the survey's adverse impacts on the availability of marine mammals for subsistence. Such measures include scheduling the seismic survey to occur after the open-water season to avoid (1) periods of greater abundance of marine mammals and (2) interference with the fall bowhead whale hunts in Kaktovik, Cross Island, and Barrow. ION would begin the survey in deeper waters in the northeast and proceed west across the Beaufort Sea to the Chukchi Sea to avoid, as much as possible, any remaining whales and associated subsistence activities. ION also would conclude its seismic survey before the formation of shore-fast ice to avoid disturbance of ringed seals that may be establishing ice lairs for breeding. In addition, ION would maintain contact with an emergency communications center in Deadhorse at all times during the survey and report to the center at least every six hours and when plans or weather conditions change. Based on the timing and location of the proposed activities and the proposed mitigation, monitoring, and reporting measures, the Service preliminarily has determined that the proposed taking would not have an unmitigable adverse impact on the availability of marine mammals for subsistence use by Alaska Natives.

Authorization of incidental takes by Level A harassment

The National Marine Fisheries Service is proposing to authorize the incidental taking of three species of marine mammals by Level A harassment using the authority of section 101(a)(5)(D) of the Marine Mammal Protection Act (i.e., under an incidental harassment authorization). Level A harassment is defined in statute and regulation as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild" (section 3(18) of the Marine Mammal Protection Act and at 50 C.F.R. § 216.3). The Service has stated, and the

Commission agrees, that the proposed activities have the potential to injure marine mammals in part because of the limited effectiveness of mitigation and monitoring measures for protecting and observing animals in ice conditions, inclement weather, and during low or no daylight hours, all of which reduce the effectiveness of visual monitoring. As a result, observers are less likely to detect a marine mammal in the proposed exclusion zone during the survey and any marine mammal in the exclusion zone is more likely to experience an injurious effect, such as a permanent reduction in hearing sensitivity (i.e., a permanent threshold shift).

The Service informed the Commission that this is the first time that the Service has proposed to authorize taking by Level A harassment under the authority of section 101(a)(5)(D) of the Act, rather than through regulations issued in accordance with section 101(a)(5)(A). Doing so would set an inappropriate precedent that is inconsistent with the intent of the Act and the Service's implementing regulations. Regulations implementing the incidental harassment authorization provisions of the Act at 50 C.F.R. § 216.107 state that authorizations may be issued for activities that may result in only the incidental harassment of a small number of marine mammals, "except for activities that have the potential to result in serious injury or mortality, which must be authorized under § 216.105."

Any permanent hearing loss could compromise the survival of the affected animal because marine mammals rely heavily on hearing for feeding, navigation, communication, detecting and avoiding predators, and other vital life functions (National Research Council 2003). Therefore, all permanent hearing loss should be considered a serious injury. And again, activities with the potential to result in serious injury require authorization by regulation in accordance with 50 C.F.R. § 216.105.

Therefore, to ensure compliance with the Act and the Service's own regulations, the Marine Mammal Commission recommends that the National Marine Fisheries Service propose to issue regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act and a letter of authorization, rather than an incidental harassment authorization, for any proposed activities expected to cause a permanent threshold shift.

Estimation of incidental takes

Observers generally cannot detect all animals that enter exclusion and disturbance zones and, in this case, their task will be more difficult when ice is present and sighting conditions are poor. For that reason, ION estimated that some animals would be exposed to sounds that are greater than the Level A and Level B harassment thresholds. However, ION's estimates of the number of animals that could be exposed are confounded by considerable uncertainty; they are based on limited or outdated stock assessment survey data and questionable assumptions regarding the behavior of, or potential injury to, animals exposed to sound pressures and energies from the proposed survey.

The Service acknowledged some uncertainty in the data and assumptions used to estimate potential takes, but considers the approach used by ION to be the best available at this time. The Commission disagrees, and believes that the Service should take a more critical look at ION's

analysis. The Commission further believes that, in view of the considerable uncertainty, the Service should require a more conservative approach—that is, one that is less likely to underestimate the number of takes that would occur as a result of the proposed survey.

Species expected to occur in the survey area. The Service anticipates that only two cetacean species (bowhead and beluga whales) and one pinniped species (ringed seals) would be present in the Beaufort Sea late in the survey or where extensive ice cover is present. Based on that assumption, it proposes to authorize taking by Level A harassment for those three species only. However, data from passive acoustic recorders deployed during winter in that area indicate that other marine mammal species are likely to be present during the survey and, therefore, they could be exposed to received sound levels greater than or equal to 180 or 190 dB re 1 μ Pa (rms).

Stafford et al. (2007) reported that gray whale vocalizations were recorded every month from October 2003 through May 2004 off Point Barrow in the Beaufort Sea. Although the presence of gray whales in the Beaufort Sea during past winters is not well described, evidence suggests that gray whales are expanding their range into the Arctic and may remain there to feed in the fall months during the survey. That expectation is certainly consistent with the warming trend in the Arctic, as described by Wang and Overland (2009). In fact, ION notes that gray whales may be present during the winter but then assigns only a minimal density estimate for this species (0.0001 whales/km²), the same density estimate assigned to other cetaceans not expected to be present during the survey.

In addition, 2009 and 2010 acoustic data from the Service's Bowhead Whale Feeding Ecology Study (Shelden and Mocklin 2012) provide evidence that bearded seals also will be present. That study recorded bearded seal vocalizations off Point Barrow, and found fairly consistent numbers of vocalizations per hour from August through December. ION acknowledged that bearded seals may be present, but, for this species, used density estimates (0.0004 seals/km²) only slightly greater than for species not expected to be present. It also did not request authorization for takes by Level A harassment for this species. To account for the presence and possible exposure of gray whales and bearded seals in the project area, the Marine Mammal Commission recommends that the National Marine Fisheries Service require ION to (1) consult with the Service's National Marine Mammal Laboratory and other researchers and revise its expected density estimates for gray whales and bearded seals to reflect new information from passive acoustic recordings, and (2) include, as appropriate, an estimate of takes by Level A harassment for those species.

Expected densities of bowhead whales. ION also appears to have underestimated the density of bowhead whales that would be present in the survey area. It first calculated average and maximum "reference" density estimates for bowhead whales in October based on multiple years of surveys. It then calculated expected densities for the eastern Beaufort survey area by reducing the average reference densities by 90 percent. It based that reduction on Miller et al. (2002), which it cited as indicating a 90 percent decrease in bowhead abundance in that area from early to late October. However, Miller et al. (2002) actually reported an overall bowhead abundance of 0.55 bowheads/100 km in early October and 0.12 bowheads/100 km in late October—that is, a reduction of 78 percent, not 90 percent. If the data in Miller et al. (2002) are considered the best available, then ION has not

used those data appropriately and, for that reason, has likely underestimated the number of bowhead whales that may remain in the eastern Beaufort in October. In addition, the density of bowhead whales in October may well be increasing each year if ice formation is occurring later in the fall. ION should be able to test for such an increase using the multi-year survey data collected in October. The error and uncertainty in ION's approach invalidate its estimate of Level A harassment takes for bowheads. To ensure that expected densities and take estimates reflect the best available data on bowhead whales during the survey period, the Marine Mammal Commission recommends that the National Marine Fisheries Service require ION to recalculate expected densities for bowhead whales based on (1) the corrected decrease in abundance of bowhead whales reported by Miller et al. (2002) for early and late October (i.e., 78 percent) and (2) any additional information from more recent surveys, including acoustic surveys, conducted by the Service's National Marine Mammal Laboratory and other researchers to assess the distribution and relative abundance of bowhead whales in the survey area from October through December.

Accounting for uncertainties in making a negligible impact finding. Take estimates are required in applications for incidental harassment authorizations to provide a basis for ensuring that the proposed activity will not have more than a negligible impact on the affected species or stocks. Take estimates are often, if not generally, associated with a considerable amount of uncertainty. If, for any given species or stock, the uncertainty in the take estimate is relatively symmetrical, then a negligible impact determination serves the purpose of the Marine Mammal Protection Act about one-half of the time if it is based on the average, or "expected" density and does not account for that uncertainty. That is, if the estimated take is an unbiased indicator of the actual take and the error around that expected value is symmetrical, then the actual number of takes will be greater than expected about half the time and less than expected about half the time. That means if the Service made its negligible determination based on the expected number of takes, but did not account for the associated uncertainty, then its assurance of a negligible impact would be sufficient for the purpose of the Act about 50 percent of the time.

For that reason, the Commission does not consider it appropriate for the Service to make a negligible impact finding based solely on the average or expected number of takes. That approach does not address the possibility that the actual takes will exceed the expected takes. To address that uncertainty, the Service should be seeking the information needed to complete the following statement: "Given the estimated number of takes and the uncertainty around that estimate, there is a 95 percent chance that the actual number of takes will be equal to or less than X, and the Service considers that taking to be negligible because"

Although ION estimated maximum and average densities, it used only the average densities to estimate expected takes. The Service appears to have done the same. That is, neither appear to have given due consideration to the error around ION's take estimates. If the expected number of takes was 1,000 plus or minus a standard error of 5 takes, the Service might consider the combination of expected number and possible error to be negligible. But if the expected number of takes was 1,000 plus or minus a standard error of 500, then the Service should reconsider whether it can provide the required assurance that the actual number of takes would be negligible. In addition,

such assurance also should account for those cases where the behavior of the potentially affected animals (e.g., beluga whales forming large social groups for foraging) could increase the chance of encountering and taking considerably more animals than one might expect on the basis of average densities.

In other incidental harassment authorizations (e.g., the U.S. Geological Survey's proposed geophysical survey in the central Gulf of Alaska; 76 Fed. Reg. 18187), the Service used maximum densities to estimate the number of takes in a way that accounted for uncertainties—uncertainties not unlike those in ION's application. The Commission does not understand why the Service did not use the same or a similar standard in this case. To address this concern, the Marine Mammal Commission recommends that the National Marine Fisheries Service provide stronger assurance that the actual number of takes would be negligible by (1) estimating the expected number of takes plus some measure of uncertainty in that estimate, (2) using maximum estimated densities of the marine mammals in the survey area to estimate takes, or (3) using some comparable approach that accounts for uncertainty and provides a high level of assurance that the actual taking would, in fact, be negligible.

Assumptions regarding avoidance of the seismic source: ION's approach to estimating takes by Level A harassment assumed that a significant portion of animals would avoid the sound source and therefore avoid exposure to received levels greater than or equal to 180 dB re 1 μ Pa. This assumption is not supported by best available scientific data or by current methods used to estimate takes, but instead appears to be an attempt by ION to reduce estimated takes by Level A harassment to the lowest levels possible.

Although observations of marine mammals around seismic sources suggests some level of avoidance, the degree of avoidance by individual animals is highly variable and may depend on a number of factors, including (1) an animal's prior experience with the sound source, (2) the consequences of previous encounter(s), (3) its auditory sensitivity, (4) its biological and social status, and (5) its behavioral state and activity at the time of the survey (Gordon et al. 2004). Without additional information on the responses of the potentially affected species/stocks to expected received levels in areas and at times proposed by ION, assumptions regarding avoidance of the sound source and resulting numbers of animals exposed to received levels constituting Level A harassment would be arbitrary and unsupported.

ION's calculation of ringed seal takes is indicative of its apparent attempt to reduce expected takes to the lowest level possible. It first estimated that 277 ringed seals could be exposed to sound greater than or equal to 190 dB re 1 μ Pa based on studies indicating that 75 percent of pinnipeds would avoid the seismic source. But it then used an alternative method based on the number of seal sightings and resulting powerdowns during a previous survey. That method resulted in an estimated take of 38 ringed seals. ION did not justify its use of the second estimate and the Commission questions whether it was appropriate given that the second estimate does not appear to be corrected for seals that were not seen during the previous survey. That is, it appears that ION assumed that the number of powerdowns during the previous survey is a reliable indicator of the number of seals

actually exposed. If that is the case and the estimated take of 38 seals for the proposed survey did not account for seals not seen, then the estimated take was undoubtedly biased low. If the estimate was biased low, then the Service needs to explain how that estimate provided a reliable basis for a negligible impact determination.

Further, ION stated that only 10 percent of those animals “initially exposed” to received levels above 180 and 190 dB re 1 μ Pa (for cetaceans and pinnipeds, respectively) would not vacate the area and, therefore, only that small portion of animals would be subject to a permanent threshold shift. The Commission believes and the Service has confirmed that this claim was not supported by any scientific data. However, the Service accepted it as the basis for further reducing the number of animals subject to a permanent threshold shift (i.e., Level A harassment).

Using those questionable methods, ION reduced the estimated number of Level A harassment takes by 99 and 99.6 percent for cetaceans and pinnipeds, respectively. Based on ION’s application and the information in the *Federal Register* notice, the Commission believes those reductions were arbitrary and inconsistent with the best available scientific methods. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service require ION to (1) revise the estimated number of Level A harassment takes to include all marine mammals that may be exposed to received levels greater than or equal to 180 and 190 dB re 1 μ Pa (for cetaceans and pinnipeds, respectively), (2) account for all sources of uncertainty in its estimation approach, including animals that may be present but not observed, (3) provide a scientific basis for any conclusions about the animals’ responses to the airguns, and (4) base its negligible impact determination on the revised estimated number of Level A harassment takes.

In-situ sound measurements for vessel sounds

ION has proposed to measure vessel sound levels (including the icebreaking vessel) on a routine basis throughout the survey using the streamer hydrophones. ION estimated that icebreaking sounds may be greater than or equal to 120 dB re 1 μ Pa out to a maximum distance of 21.6 km. That distance is less than that at which sounds from the airguns would be greater than or equal to 160 dB re 1 μ Pa. Therefore, no additional takes were calculated for icebreaking activities during the seismic survey (although takes were calculated for refueling activities). In addition, sound levels were not available for the icebreaking vessel proposed for use in this survey. Instead, ION based its sound measurements on surveys conducted nearly 30 years ago on different vessels (Zykov et al. 2011). The Commission does not consider it reasonable to assume the vessel sounds would be comparable. For that reason, the Marine Mammal Commission recommends that the National Marine Fisheries Service require ION to (1) record, analyze, and report (within five days of collecting the data) the results of measurements of vessel sounds, including the icebreaking vessel and (2) adjust the size of the 120-dB re 1 μ Pa harassment zone and revise the estimated number of animals expected to be taken by Level B harassment for all icebreaking activities, as necessary.

Mitigation and monitoring measures

ION has proposed to conduct its survey in the fall when the number of marine mammals in the area is expected to be less than during the open-water season. However, ice coverage increases as autumn progresses and visibility worsens with more ice, diminishing hours of daylight, and no direct sunlight after mid-November. In addition, the exclusion zones for the survey are relatively large. These factors raise significant concerns about the effectiveness of the proposed mitigation and monitoring measures, particularly because they are highly dependent on visual observation. In previous letters, the Commission has questioned whether observers would be able to see marine mammals approaching, entering, or within an exclusion zone larger than a few hundred meters. If observers are unable to monitor the exclusion zone effectively, then important mitigation measures including ramp-up, power-down, and shut-down procedures are not likely to be implemented reliably. If that is the case, then Level A harassment is more likely to occur unless additional mitigation measures are implemented.

ION proposed to use night vision devices and forward-looking infrared to monitor the exclusion zones during darkness, but acknowledged that those tools have not been proven reliable in those conditions. To specifically address the shortcoming of visual observations as a mitigation strategy in poor visibility conditions, the Marine Mammal Commission recommends that the National Marine Fisheries Service require ION to use passive and active acoustic monitoring, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound.

ION also proposed that vessels operating in the survey area would reduce their speed while in transit or in poor visibility conditions. However, the Service did not specify the appropriate vessel operating speeds in the proposed authorization. To address any ambiguity regarding safe vessel operating speeds, and for consistency with previous Commission recommendations regarding vessel operations in the Arctic, the Marine Mammal Commission recommends that the National Marine Fisheries Service specify reduced vessel speeds of 9 knots or less when in transit and 5 knots or less when weather conditions or darkness reduce visibility.

To ensure that aggregations of bowhead whales engaged in feeding or socializing are protected from disturbance, the Marine Mammal Commission recommends that the National Marine Fisheries Service require ION to establish and monitor adequately both a 160- and a 120-dB re 1 μ Pa disturbance zone around all sound sources and to not initiate or continue an activity if (1) an aggregation of bowhead whales or gray whales (12 or more whales of any age/sex class that appear to be engaged in a non-migratory, significant biological behavior (e.g., feeding, socializing)) is observed within the 160-dB re 1 μ Pa zone, or (2) a female-calf pair is observed within the 120-dB re 1 μ Pa zone. The Service has imposed similar requirements in other incidental harassment authorizations in the Arctic (e.g., 77 Fed. Reg. 40007) and the Commission believes they also should be included in this authorization, if issued.

Mr. P. Michael Payne
21 September 2012
Page 11

Finally, the uncertainty regarding the efficacy of mitigation and monitoring methods still needs to be addressed, as the Commission has noted in numerous other letters for incidental harassment authorizations. Stated frankly, those measures provide some basis for protecting marine mammals, but they also are compromised by obvious shortcomings. In reviewing applications for incidental harassment authorizations, the Service is in the difficult position of having to judge whether the level of protection afforded by proposed mitigation and monitoring measures is sufficient. The scientific information available to support such a decision is simply not adequate at this time and, in the Commission's view, the Service thus will keep making decisions that involve uncertainty. However, it also has the opportunity and latitude to reduce that uncertainty by structuring authorizations in ways that use mitigation and monitoring methods to collect the needed scientific data. Taking such an approach would require the cooperation of the various action agencies, organizations, and industries involved, but also would provide a much stronger basis for making informed decisions in the future.

To improve mitigation and monitoring methods over time, the Commission would be pleased to work with the Service to identify (1) the types of seismic surveys of greatest concern, (2) the species at greatest risk and most difficult to detect and/or protect, (3) the tools that either are available now or need further development to improve mitigation and monitoring methods, and (4) the types of scientific data needed to assess and improve the efficacy of these methods.

Please contact me if you have questions regarding these recommendations.

Sincerely,



Timothy J. Ragen, Ph.D.
Executive Director

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

References

- Gordon, J., D. Gillespie, J. Potter, A. Frantzis, M.P. Simmonds, R. Swift, and D. Thompson. 2004. A review of the effects of seismic surveys on marine mammals. *Marine Technology Society Journal* 37(4):16-34.
- Miller, G.W., R.E. Elliot, T.A. Thomas, V.D. Moulton, and W.R. Koski. 2002. Distribution and numbers of bowhead whales in the eastern Alaskan Beaufort Sea during late summer and autumn, 1979-2000. Chapter 9 *in* Richardson, W.J., and D.H. Thomson (eds.), *Bowhead whale feeding in the eastern Alaskan Beaufort Sea: update of scientific and traditional*

information. OCS Study MMS 2002-012; LGL Rep. TA2196-7. Report from LGL Ltd., King City, Ont., for U.S. Minerals Management Service, Anchorage, Alaska, and Herndon, Virginia, xlv + 697 pages, 2 volumes, NTIS PB2004-101568.

Moore, S.E., and R.P. Angliss. 2005. Overview of planned seismic surveys offshore northern Alaska, July-October 2006. International Whaling Commission Scientific Committee Report SC.58.E6.

National Research Council. 2003. Ocean Noise and Marine Mammals. National Academies Press, Washington, D.C., 192 pages.

Shelden, K.E.W., and J.A. Mocklin (eds.). 2012. Bowhead Whale Feeding Ecology Study (BOWFEST) in the western Beaufort Sea. Annual Report, OCS Study Bureau of Ocean Energy Management (BOEM) 2012-077. National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 7600 Sand Point Way NE, Seattle, WA 98115.

Stafford, K.M., S.E. Moore, M. Spillane, and S. Wiggins. 2007. Gray whale calls recorded near Barrow, Alaska, throughout the winter of 2003–04. *Arctic* 60(2):167-172.

Wang, M., and J. Overland. 2009. A sea ice free summer Arctic within 30 years? *Geophysical Research Letters* 36, L07502, doi:10.1029/2009GL037820.

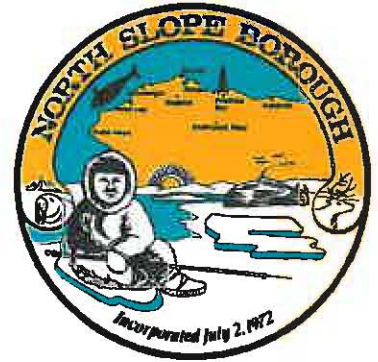
Zykov, M., T. Deveau, M.-N. R. Matthews, and D. Hannay. 2011. Modeling of underwater sound from ION's Beaufort 4 source in the Alaskan Beaufort Sea. Report by JASCO Applied Sciences Ltd. for LGL, Alaska. 28 pages.

North Slope Borough

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Charlotte E. Brower, Mayor



September 19, 2012

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Re: Incidental Harassment Authorization (IHA) application from ION Geophysical for seismic survey in Beaufort and Chukchi Seas between October and December 2012

Dear Mr. Payne:

Thank you for the opportunity to comment on NMFS's proposal issue an Incidental Harassment Authorization (IHA) to ION Geophysical (ION) for seismic surveys in the Beaufort and Chukchi Seas between October and December 2012.

The North Slope Borough (NSB) is the regional municipal government for the northern 89,000 square miles of Alaska. Our coastline stretches from the U.S.-Canadian border, across to the western border of Alaska. The vast majority of our residents are Inupiat Eskimos who rely heavily on marine mammals for cultural and nutritional needs.

ION proposes to conduct geophysical in-ice (seismic reflection/refraction) survey over the Beaufort and Chukchi Seas this year between October and December. The primary survey area is quite substantial, extending from the U.S.—Canadian border in the east to Point Barrow in the west. ION also proposes two survey lines extending west of Point Barrow into the northern Chukchi Sea and three short tie lines near the U.S.—Russian border. The survey grid consists of approximately 7,175 km of transect line, not including transits when the airguns are not operating. The seismic vessel will be escorted by a medium class icebreaker and ION anticipates conducting the survey in up to 10/10 ice cover. The noise associated with the seismic airgun array, echo sounders, ice breaking and other activity associated with this project will harass and, as NMFS' recognizes, potentially injure marine mammals that our communities rely upon.

Initially, we note that ION proposes to conduct the geophysical survey between approximately October 1 and December 15, 2012. This schedule means that the surveys will likely occur after the completion of the autumn bowhead hunts. This will help to reduce impacts related to the availability of bowhead whales to hunters of Kaktovik, Nuiqsut and Barrow. The NSB does appreciate this effort to reduce impacts to the subsistence hunt that is so critical to our communities.

Unfortunately, conducting seismic surveys in October, November and December creates other difficulties. First, there are relatively few data on how many marine mammals are present in the Beaufort and northeastern Chukchi seas from October to December. Without robust data regarding the numbers and density of marine mammals in the region there is a great uncertainty in the predictions of the species and numbers of marine mammals that may be exposed to the seismic surveys. Recent acoustics data suggests that bowhead and gray whales may remain in the area much longer than previously thought. Unfortunately, the acoustic data do not provide quantitative data on how many individuals might be present. Additionally, there is uncertainty in ION's estimates of the numbers of animals that may be taken during the seismic surveys.

Second, the only monitoring proposed by ION is marine mammal observers on board the ice breaker and seismic source vessel. Visual observers aboard vessels have substantial limitations even in fair weather, ice-free seas, and long daylight hours. Even in such favorable conditions, visual observer's ability to detect marine mammals diminishes within hundreds of meters. That ability will be even further compromised during October through December because of forming sea ice, inclement weather, and darkness. The sun will set for the last time in 2012 in mid-November. Thus, almost half of ION's proposed surveys will occur when the sun does not rise above the horizon. ION has proposed to use spotlights to aid observers. This approach may very well help but has not been tested. It is likely that spotlights will not be equivalent to full sunlight.

There are measures that could address some of these seasonal difficulties. In particular, monitoring could be dramatically improved through acoustic monitoring, which would not have many of the limitations that plague visual observers. Shell has plans to leave several acoustic recorders in the Beaufort Sea over the winter in 2012/2013. We recommend that ION deploy their own acoustic recorders and also collect the data provided by Shell's recorders. Other monitoring techniques could include passive acoustic monitoring from a chase or safety vessel, in addition to the ice breaker. The other vessels could assist with acoustic and visual monitoring for the source vessel and conduct sound source verification tests regularly across the Beaufort Sea. These additional monitoring measures could provide useful data for possible future autumn seismic surveys.

Monitoring activities are critically important to support and inform NMFS' understanding of when impacts to marine mammals might rise above unacceptable thresholds. It would be a reasonable tradeoff to allow ION to conduct seismic surveys in 2012 if sufficient data were made available to help understand and mitigate potential impacts for future surveys.

Thank you for considering our comments.

Sincerely,


Charlotte E. Brower
Mayor

CC: Jacob Adams, Sr., CAO
Randy Hoffbeck, COS
John Boyle, Advisor
Richard Camilleri, Advisor
Fred Parady, Advisor
Ethel Patkotak, Borough Attorney
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September 17, 2012

VIA EMAIL

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Re: ION Geophysical Application to Take Marine Mammals Incidental to a Proposed Marine Seismic Survey in the Beaufort and Chukchi Seas (77 Fed. Reg. 49,921 (August 17, 2012))

Dear Mr. Payne,

Ocean Conservancy appreciates the opportunity to comment on the National Marine Fisheries Service's ("NMFS") proposal to issue an incidental harassment authorization ("IHA") to ION Geophysical ("ION"). In this case, issuance of an IHA is inconsistent with the Marine Mammal Protection Act (MMPA) and implementing regulations. Given the nature, timing, and likely impacts of ION's proposed seismic testing activities, we urge NMFS to not to issue the proposed IHA.

ION proposes to conduct seismic testing in the Alaska Beaufort and Chukchi seas from October to December 2012, using a 26-airgun array with a total volume of 4,450 cubic inches. ION's plan calls for survey transects covering an area greater than 4,450 square miles over the course of 76 days. The proposed survey is scheduled late in the year, when daylight is dwindling and ice cover is growing. As a result, ION plans to have an icebreaker escort its seismic vessel. The icebreaker's operations will increase the overall noise and disturbance associated with the survey.

It is inappropriate to issue an IHA for ION's proposed seismic survey for a number of reasons. For example:

- The proposed survey has the potential to cause permanent hearing loss in marine mammals. Such hearing loss constitutes "serious injury." Regulations implementing the MMPA prohibit issuance of an IHA for activity that has even the potential to result in serious injury to marine mammals. 50 C.F.R. § 216.107.

- The proposed survey would result in harassment takes of a large number of marine mammals. According to NMFS's own estimates, the proposed IHA would authorize the exposure of more than 250 bowhead whales, 4,300 beluga whales, and 60,000 ringed seals to received sound levels equal to or greater than 160dB (rms). The MMPA prohibits NMFS from authorizing the take of more than small numbers of marine mammals. 16 U.S.C. § 1371(a)(5)(D)(i). The ION IHA, as proposed, is inconsistent with that prohibition.
- The proposed survey also has the potential to have more than a negligible impact on populations of marine mammals. Again, this is inconsistent with the MMPA. NMFS's analysis underestimates the impact of stress and the effects of airguns on bowhead whales and fails consider cumulative impacts adequately.

These and many other flaws are highlighted in a comment letter dated September 17 submitted to NMFS by Alaska Wilderness League et al ("AWL comment letter"). To minimize repetition, Ocean Conservancy joins the AWL comment letter, incorporates it by reference, and adopts all issues, arguments, and citations included in the AWL comment letter.

The proposed IHA for ION conflicts with the MMPA and its implementing regulations, and is inconsistent with science-based management of the biological resources. We urge NMFS not to issue the proposed IHA.

Sincerely,



Andrew Hartsig
Director, Arctic Program

September 17, 2012

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

Re: Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Marine Seismic Survey in the Beaufort and Chukchi Seas, Alaska, 77 Fed. Reg. 49,921 (August 17, 2012)

Dear Mr. Payne,

We believe that the requested Incidental Harassment Permits by ION Geophysical for proposed seismic surveys in the Arctic should be denied because introducing these operations in the Arctic is ill-advised and reckless. The Arctic is currently a pristine biological (and bio-acoustic) environment that is coming under increasing stress due to climate change, increase in shipping traffic, and increasing industrial exploitation. Adding seismic surveys on top of these stressors does not bode well for the health of Arctic marine life.

We find it remarkable that while the Federal Register request is full of citations that point to migratory and feeding disruptions to beluga, bowhead, and humpback whales at distances much greater than the exclusion zones described in the request, nonetheless the opinions expressed in the request capriciously point to “negligible impacts.” This situation is aggravated by NMFS overstepping the “small numbers” caveat in the Marine Mammal Protection Act (MMPA) subjecting significant proportions of beluga whales and pinniped populations.

This situation is further aggravated by the proposed season of the surveys heading into the dark of winter when visual acuity of marine mammal observers will be limited by darkness and also by increasing ice cover and other winter-onset weather conditions. That the surveys will be conducted with the assistance of icebreakers further increases the acoustical impact of the proposed surveys.

It is becoming increasingly evident that the impact of human generated noise on marine habitat is compromising the natural adaptations of marine mammals.[\[1\]](#) While the habitat disruptions mentioned in the request only extend to the impacts that the seismic surveys might have on some of the ‘prey fish; of the marine

mammals, we know that healthy habitats do not consist of individual species of animals distributed across a trophic hierarchy; rather healthy habitat includes all of the biological interactions found within a physical environment.

These interactions include the natural histories of invertebrates; mollusks, various arthropods, cnardia, ctenophora, and echinoderms – most of which in the Arctic are unknown to science. It stands to reason that an environment that is completely dark through a large portion of the year would drive acoustical adaptations in animals that while not “listed marine mammals,” but are nonetheless important building blocks of marine mammal habitat. We have no idea what impacts that ceaseless trains high-energy impulses will have on the complete habitat, although it is clear that the overall ambient noise levels could increase by 8dB re $1\mu\text{Pa}^2/\text{Hz}$.⁽²⁾ And while this does not seem “excessive,” when the ambient noise levels during the loudest part of the year (October) are not greater than 80–83 dB re: $1\mu\text{Pa}^2/\text{Hz}$ at 20–50 Hz,⁽³⁾ adding 8dB represents an increase of over 600% above the acoustical energy in the ambient field. And this does not account for the +160dB to 200dB that biota will be subjected to in the near field.

Additionally the request does not take into account the accumulative and synergistic impacts of the surveys in the context of all of the dramatic changes, and thus biological stressors that are visiting the environment. Measuring the impacts of a single aggravator such as the distant sound of seismic surveys banging away for days and months on end may be hard to gauge on individual animals. But the unpredictable biological impacts of the extreme melt-back of arctic ice,⁽⁴⁾ increased noise from shipping traffic, extractive industries access to greater habitat (some of which has not been exposed to sunlight for eons), and the increasing pressures of exploratory (and extractive) drilling operations for hydrocarbon all needs to be figured into any proposed action that will disrupt normal biological functions.

Western scientists know so little about the Arctic; the animals that reside there and their interactions and adaptations to a mysterious and extreme environment. In relentlessly pursuing Arctic hydrocarbon deposits we stand to destroy biological interactions that we may ourselves – and certainly the Arctic indigenous people depend on for survival.

Most of our understanding of what constitutes an assault to an environment has been derived from habitat (and captive) studies in temperate and tropical waters. Applying mitigation protocols and making assumptions about “negligible impacts” based on these legacy studies is the apex of hubris. We know so little about the biology of the arctic that sending in broad and chronic disruptions is reckless,

irresponsible, and should not be permitted until we have a full understand of the impacts – and what we stand to lose.

Sincerely,



Michael Stocker
Director



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

[2] Ethan H Roth, John A. Hildebrand, Sean M. Wiggins, and Donald Ross “Underwater ambient noise on the Chukchi Sea continental slope from 2006–2009” J. Acoust. Soc. Am. 131 (1), January 2012

[3] Ibid.

[4] Quirin Schiermeier “Ice loss shifts Arctic cycles” Nature v.489 Sept. 2012

VIA EMAIL

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Re: National Marine Fisheries Service Proposal to Issue an Incidental Harassment Authorization for ION Geophysical's Proposed Seismic Surveys in the Beaufort and Chukchi Seas

Dear Mr. Payne:

Oceana appreciates the opportunity to submit comments on the National Marine Fisheries Service's ("NMFS") August 17, 2012 proposal to issue an incidental harassment authorization ("IHA") to ION Geophysical ("ION") for seismic surveys in the Beaufort and Chukchi Seas. 77 Fed. Reg. 49,921 (August 17, 2012). The proposed activities would take place from October to December 2012 and would affect whales, seals, and other marine mammals protected by the Marine Mammal Protection Act ("MMPA"). NMFS proposes to allow incidental take by both Level A and Level B harassment of several marine mammal species despite significant scientific uncertainty and the strict requirements of the MMPA. Consistent with NMFS's commitment to science-based management and its stewardship obligations, the agency should deny ION's application for an IHA.¹

ION proposes to use very powerful arrays of seismic guns over 76 days beginning in October and ending in December. Its surveys will be accompanied by an ice breaker and will take place in remote waters that are important to a variety of marine life, including whales, seals, polar bears, and walrus protected by the MMPA. There is a substantial lack of basic scientific information about these areas that make it impossible to understand fully the potential impacts of activities like those ION proposes. Moreover, these surveys will occur as the region is subject to increasing darkness, inclement weather, rough seas, and encroaching ice. Those factors will hinder typical mitigation techniques based on observing marine mammals by making it difficult or impossible to see animals in the area.

These activities cannot be authorized under the MMPA as NMFS proposes. They have the potential to cause "serious injury" to marine mammals and, therefore, cannot be allowed through an IHA. In addition, the proposed activities will result in harassment of a substantial number of whales and seals, in violation of the "small numbers" requirement of the MMPA. Further, these activities could have more than a negligible impact on populations of these marine mammals, and, therefore, are not allowed under the MMPA.

¹ Oceana supports and incorporates comments submitted on behalf of Earthjustice, Alaska Wilderness League, and others providing additional detail and reasons for which the proposed IHA should not be issued.

In addition, NMFS makes no mention of its longstanding effort to develop a programmatic review of oil and gas exploration. NMFS released a Draft Programmatic Environmental Impact Statement (“PEIS”) in December of 2011 and recently announced that the final PEIS will be delayed to allow for additional analysis covering a broader range of exploratory drilling activities. As we have made clear in the past, NMFS should not proceed with authorizations for individual projects like the ION proposal until the ongoing programmatic EIS is complete. NMFS must be particularly careful to evaluate all cumulative impacts that may result from the likely increase in industrial activities in the Arctic in coming years.

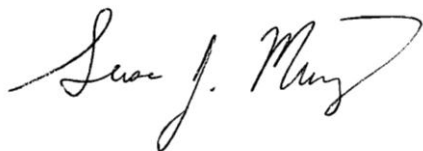
Further, we are concerned that the possible impacts on bearded seals may be more significant than disclosed in the proposal. As shown in the attached Alaska Marine Science Symposium posters, recent passive acoustic monitoring within the study area indicates that bearded seals are present year-round. While much of the population of bearded seals migrates into the Bering Sea, it is also clear that a subset of the population remains in the Beaufort and Chukchi seas year-round. One hypothesis to explain this phenomenon is that these animals are large males staking territory for the spring breeding season (pers. comm. between C. Krenz and P. Boveng). Nonetheless, it is clear that some bearded seals overwinter in these waters and that NMFS’s estimate of the density of these animals is likely low. The proposed IHA, therefore, may underestimate the number of bearded seals impacted by this proposed permit.

As indicated in the proposal by NMFS, pinnipeds have a limited tendency to avoid seismic activities. Combined with the potential underestimate of bearded seal density, we are concerned that bearded seals will also experience Level A harassment. With the potential that bearded seals could be establishing territories during ION’s activities, there is increased concern that these pinnipeds will not move away from seismic activities. In addition, ringed seals may also be establishing lairs and territories at this time and, therefore also be disinclined to move. These activities could result in more Level A harassment than NMFS estimates.

Granting ION an IHA for its proposed activities is inconsistent with NMFS legal obligations and its commitment to science-based, precautionary management. The agency should not proceed in this manner and, instead, should deny the application for an IHA.

We look forward to working with you on this issue.

Sincerely,

A handwritten signature in black ink that reads "Susan J. Murray". The signature is fluid and cursive, with the first name "Susan" and last name "Murray" clearly legible.

Susan Murray
Senior Director, Pacific
Oceana

Year-round passive acoustic monitoring of bearded seal vocalizations at four locations in the Beaufort Sea, 2008-2010



Kalyn Q. MacIntyre¹, Kathleen M. Stafford², Catherine L. Berchok¹, and Peter L. Boveng¹
 (1) National Marine Mammal Laboratory, NOAA, 7600 Sand Point Way NE, Seattle, WA, 98115, USA
 (2) Applied Physics Laboratory, University of Washington, 1013 NE 40th St., Seattle, Washington, 98105, USA



Photo by: John Jansen, AFSC/NOAA

Bearded seals (*Erignathus barbatus*) are a pan-Arctic species that are relatively abundant and widely distributed in the high north. In the Beaufort Sea, they occur mostly on pack ice, migrating with the annual advance and retreat of the ice front. These highly vocal ice seals are known for their long, loud trills, produced primarily in the spring and believed to be a male reproductive display. Passive acoustic data were collected for two consecutive years from August 2008 through August 2010 at 2 locations, and a single year at 2 alternate locations (6 total deployments.) All sites were within 200 km of each other in the western Beaufort Sea. All instruments were suspended 5 m above the sea floor and moored at 50-100 m depth. Five instruments recorded on a 30% duty cycle from 10-4096 Hz; a single instrument in 2009-10 recorded on a 20% duty cycle (10-8192 Hz bandwidth). Acoustic data were visually examined for bearded seal calls to obtain presence of vocalizations. For each instrument, the number of hours per day with vocalizations was compared with satellite-derived daily sea ice concentration. At all sites, bearded seals were vocally active year-round. The peak in calling occurred in the spring, coinciding with mating season and preceding break-up of the sea ice. The fewest calls were detected in August, when sea ice concentrations were at their lowest, and calls increased with the formation of pack ice in the winter. A similar seasonal pattern was observed for both years, but daily call counts were lower in 2009-2010. Fall pack ice formed later in 2009 but spring sea ice concentration was similar for both years. This study provides new information on fall and winter bearded seal vocal behavior and its relation to annual sea ice coverage.

Introduction

Bearded seals (*Erignathus barbatus*) are a highly vocal ice seal that is widely distributed throughout the northern Bering, Chukchi, and Beaufort Seas. Little is known about bearded seal abundance and distribution throughout the year in the Beaufort Sea due to the relative inaccessibility of the Arctic. The use of autonomous long-term acoustic recordings has enabled investigations into acoustic behavior and seasonal occurrence, allowing for future studies on distribution and population structure. Bearded seals demonstrate variations in intraspecific behavior as some seals migrate from the Bering Sea with the spring sea ice retreat and others overwinter in the Arctic in reoccurring polynyas or drifting sea ice (Burns et al., 1981b). During the spring months, when the sea ice is retreating, male bearded seals produce reproductive displays consisting of long loud trills (Van Parijs and Clark, 2006). These are speculated to be an advertisement of breeding condition and/or to maintain aquatic territories (Risch et al., 2007). Threats posed by diminishing sea ice, which is crucial habitat for birthing and molting, have led to a proposed listing of the bearded seal as threatened under the Endangered Species Act.

Methods

Hydrophone Locations: Beaufort Sea

- Hydrophone packages were moored at 4 sites (A1, A2, W1, BF01) in the western Beaufort Sea from 2008-2009 and again from 2009-2010
- Instruments (Multi-electronique Aural M2, www.multi-electronique.com) recorded on a 30% duty cycle from 10-4096 Hz or a 20% duty cycle from 10-8192 Hz bandwidth for an entire year
- All instruments suspended 5 m above seafloor
- A1 and A2 were moored in ~100 m of water
- W1 was moored in 50 m of water
- BF01 was moored in 72 m of water
- Deployed in August of 2008 and 2009
- Retrieved in late July 2009 and early August 2010

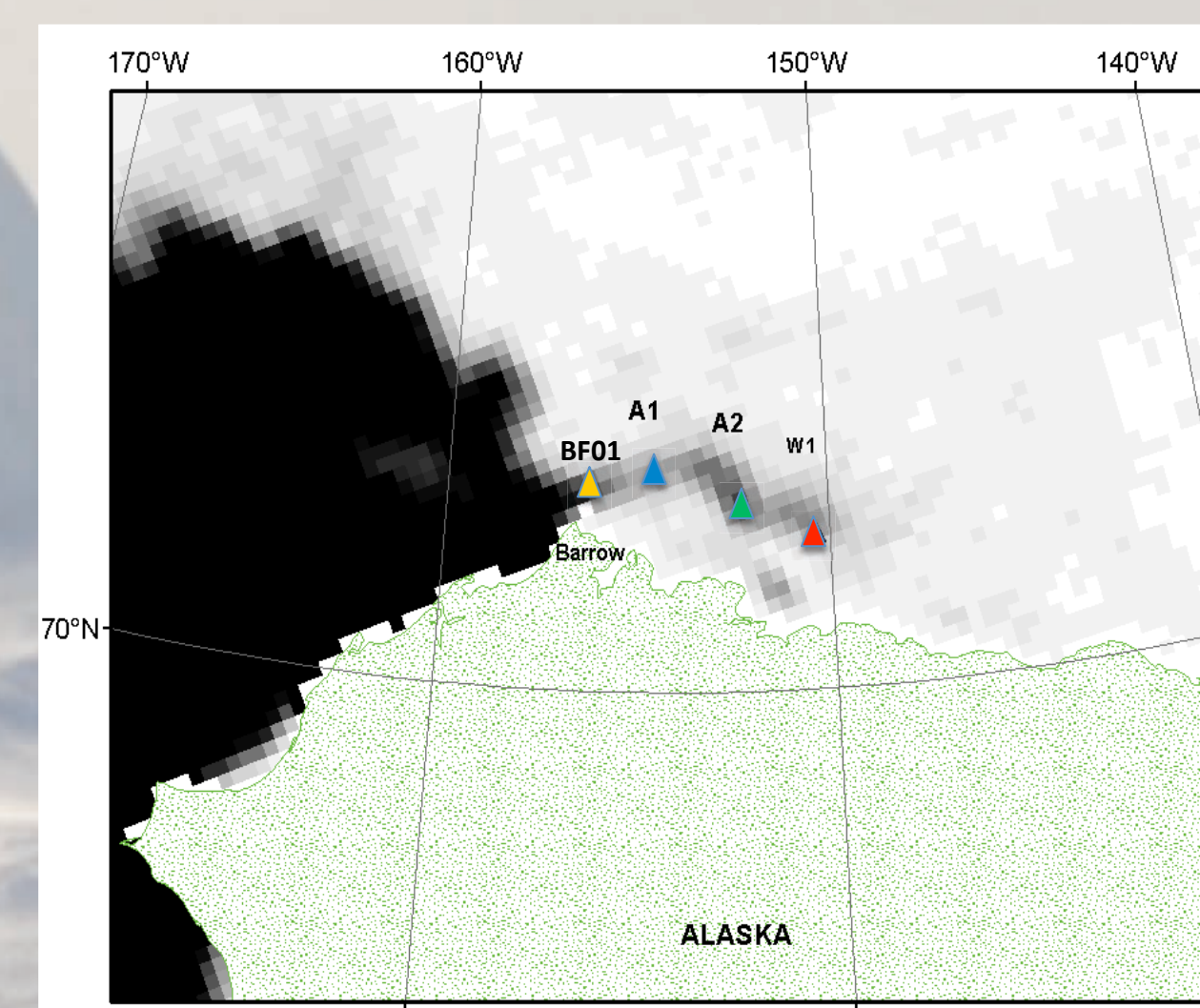


Figure 1. On this map, sea ice imagery from 31 October 2008 shows a lead along the shelf break. Ice concentration data were obtained from the National Snow and Ice Data Center (NSIDC, <http://n4eil01u.ecs.nasa.gov>).

Data Processing

- Acoustic data from each site were visually examined for bearded seal calls
- Mean sea ice concentration was determined using a 20 km radius around each mooring location
- Results of bearded seal calling presence and occurrence was compared with satellite-derived mean sea ice concentration for each year

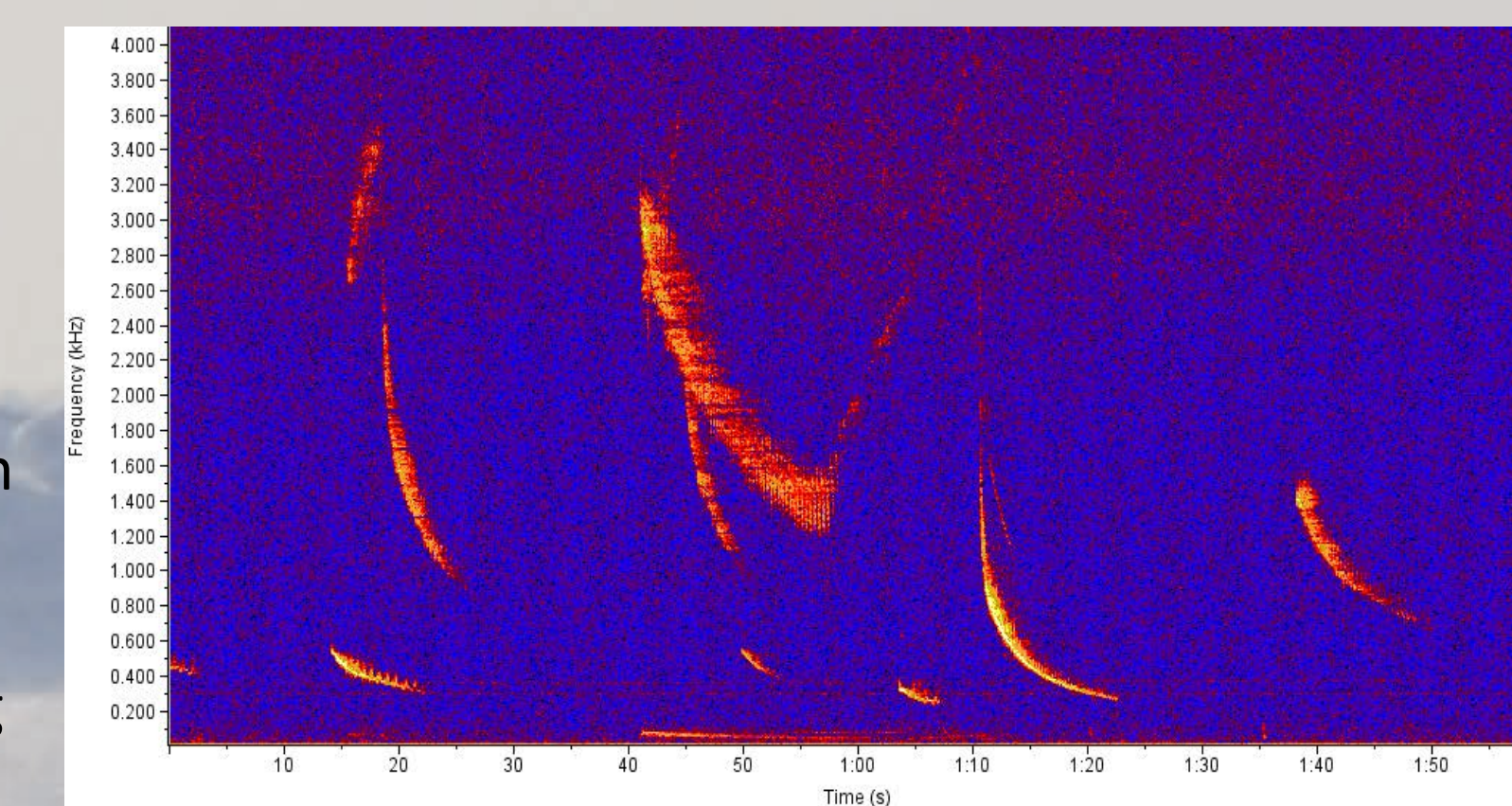


Figure 2. Spectrogram containing examples of high-, mid-, and low-frequency bearded seal calls from W1, recorded 18 April 2009 (Spectrogram parameters 2048 pt FFT, 50% overlap, Hann window).

Conclusions

- Bearded seal calls were recorded in all months (except August where the number of calls drops off to near zero) in both years at all sites with a clear seasonal peak in late winter/early spring
- Site A1 had many more hours with calls over a longer period of time than sites A2, W1 or BF01 for both 2008-09 and 2009-10
- The drop off in number of calls per month in May 2008-09 recorded at Site A2 and W1 is unexplained and not repeated in 2009-10
- Bearded seals are the greatest contributor of biological sound year-round in the Beaufort Sea
- In general, there was a reduction in the number of hours with calls coincident with lower sea ice presence
- Peak bearded seal calling activity occurred ~3 weeks later in 2009 than in 2008 at all mooring locations and could be attributed to the observed ~2 week delay in the formation of sea ice
- The sea ice presence for 2009-10 was ~2 weeks shorter than in 2008-09 and may have influenced the overall shorter temporal bearded seal calling presence for that year
- In the summer, calling ceased abruptly with seasonal decrease in ice cover suggesting that further decreases in sea ice, especially in spring/summer, may negatively impact the survival of bearded seals due to loss of crucial birthing habitat

Future Directions:

- Examine individual calls and call types for geographic and seasonal variations
- Statistically correlate call detections with oceanographic data such as temperature, sea ice cover and concentration, and currents
- Look at long term, multi-year data for population trends

Between Year Comparisons of Bearded Seal Calls and Sea Ice Concentrations for 2008-2010

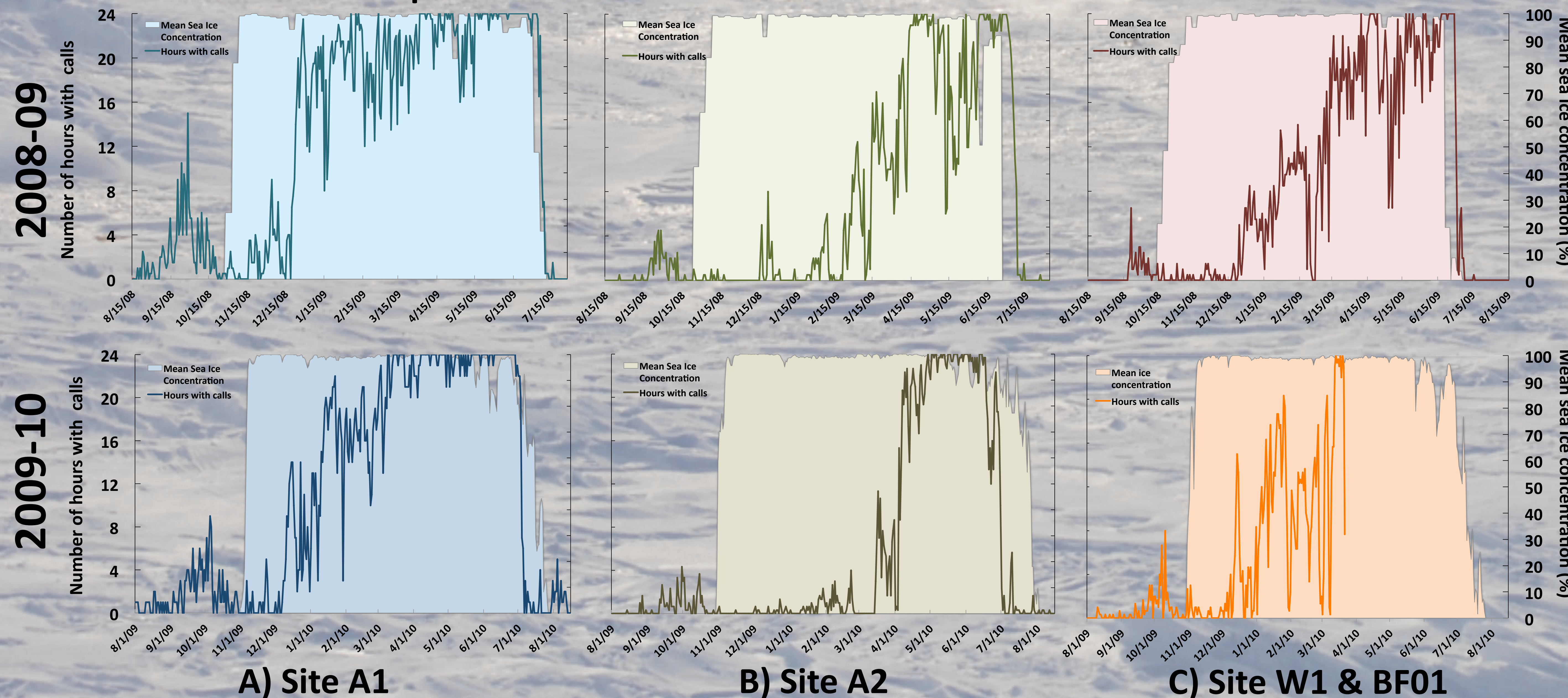


Figure 3. The number of hours per day with calls was tallied and plotted with satellite-derived mean sea concentration calculated for the corresponding time period. In each graph bearded seal number of hours per day with calls are represented by a line graph and mean sea ice concentration is represented by an area graph. A) Site A1 data: 2008-09 (top) and 2009-10 (bottom). B) Site A2 data: 2008-09 (top) and 2009-10 (bottom). C) Site W1: 2008-09 (top) and BF01: 2009-10 (bottom). The instrument moored at Site BF01 stopped recording on March 18, 2010, which is reflected in the absence of calls on the graph after mid-March. In general the number of hours with calls is lower with 0% sea ice concentration and higher as the sea ice concentration increases and sustains at ~100% mean concentration. Site A1 had many more hours over a long time period with calls in both 2008-09 and 2009-10.

References cited:

- Burns, J.J. 1970. Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi Seas. *Journal of Mammalogy* 51, 445 – 454.
 Burns, J.J., Ridgeway, S.H., Harrison, R.J. 1981a. Bearded Seal – *Erignathus barbatus* Erxleben, 1777. *Handbook of Marine Mammals*. Volume 2. Seals. 145-170.
 Risch, D., Clark C.W., Corkeron, P.J., Elepfandt, A., Kovacs, K.M., Lydersen, C., Stirling, I., and Van Parijs, S.M. 2007. Vocalizations of male bearded seals, *Erignathus barbatus*: classification and geographical variation. *Animal Behavior* 73, 747-762.
 Van Parijs, S.M. and Clark, C.W. 2006. Long-term mating tactics in an aquatic-mating pinniped, the bearded seal, *Erignathus barbatus*. *Animal Behavior* 72, 1269 – 1277.

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Photo by: John Jansen, AFSC/NOAA



YEAR-ROUND PASSIVE ACOUSTIC MONITORING OF BEARDED SEAL VOCALIZATIONS AT THREE LOCATIONS IN THE BEAUFORT SEA

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Bearded seals (*Erignathus barbatus*) are a pan-Arctic species that are relatively abundant and widely distributed in the high north. In the Beaufort Sea, bearded seals occur mostly on pack ice, migrating with the advance and retreat of the ice front through the Bering Strait. Bearded seals are known for their long loud trills that are produced primarily in the spring and are believed to be a male reproductive display. Most work on bearded seal acoustics has taken place during spring months as this is when the seals are most vocally active. Here we present data on the occurrence of bearded seal vocalizations from August 2008-August 2009 from three locations in the western Beaufort Sea. Passive acoustic data were collected using hydrophone packages (Multi-electronique Aural M-2) that had an effective bandwidth of 10-4000 Hz and a duty cycle of 9 min on every 30 min. The instruments were moored on the 100 m contour and suspended 5 m above the sea floor. Bearded seal vocalizations were initially detected automatically and then manually checked for verification. Each site showed that bearded seals were vocally active year-round with the greatest number of vocalizations in the spring, coinciding with mating season, and fewest calls detected in August. Comparisons of vocal activity between sites, with ice cover and water temperature will be presented.

Background

Bearded seals (*Erignathus barbatus*) are a highly vocal ice seal that is widely distributed throughout the northern Bering, Chukchi, and Beaufort Seas although little is known about their abundance and distribution throughout the year in the Beaufort Sea. Due to the relative inaccessibility of the Arctic during winter and early spring when they are thought to be most vocal, passive acoustic monitoring has been used as an effective method of determining bearded seal distribution. During the spring months, male bearded seals produce reproductive displays consisting of long loud trills (Van Parijs and Clark, 2006). These are speculated to be an advertisement of breeding condition and/or to maintain aquatic territories (Risch et al., 2007). Threats posed by diminishing sea ice, which is crucial habitat for birthing and molting, have led to a proposed listing of the bearded seal as threatened under the Endangered Species Act.

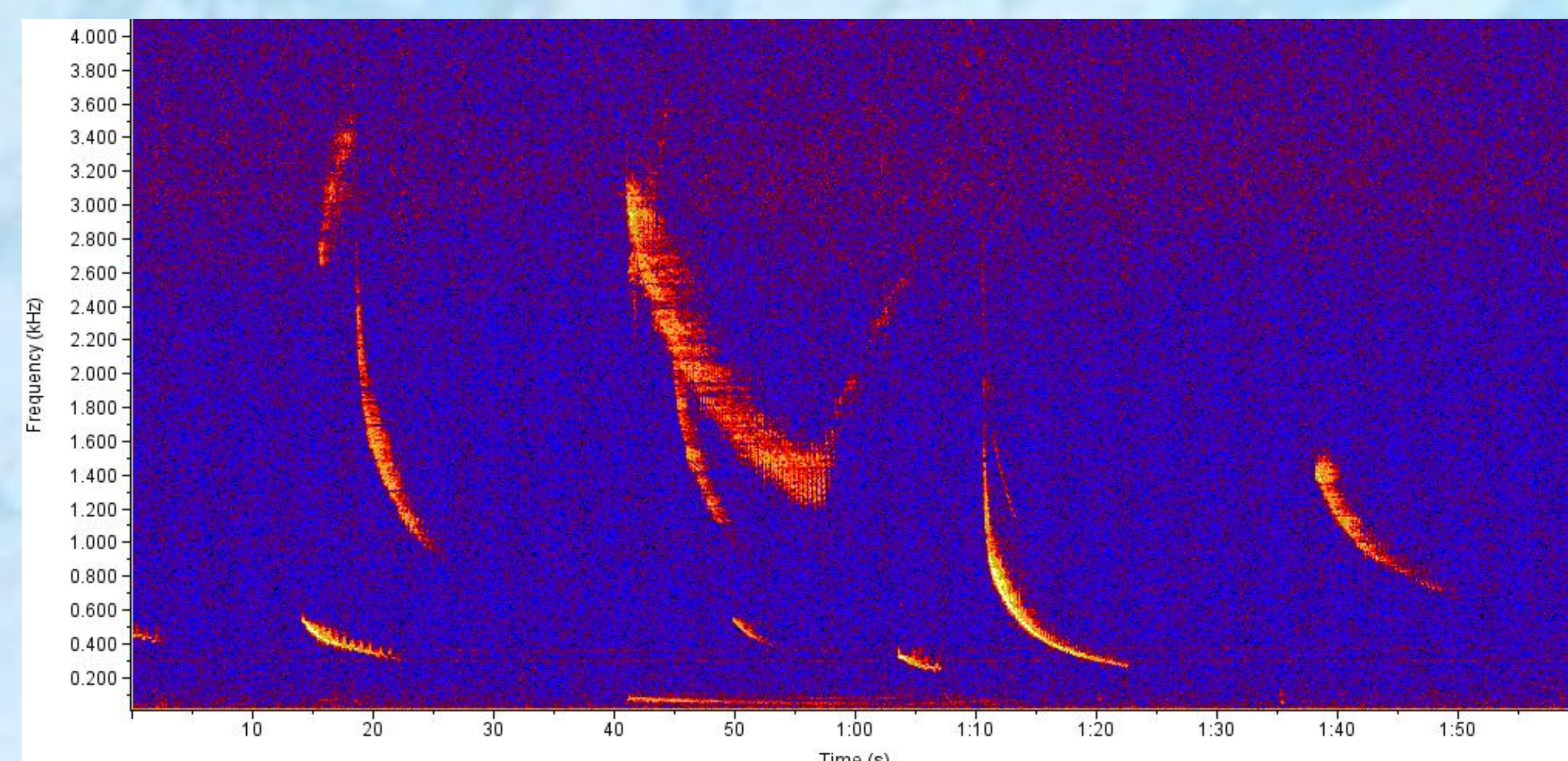


Figure 1. Spectrograms containing examples of high-, mid-, and low-frequency bearded seal calls from W1, recorded 18 April 2009 (Spectrogram parameters 2048 pt FFT, 50% overlap, Hann window).

Hourly detection of bearded seal calls by day

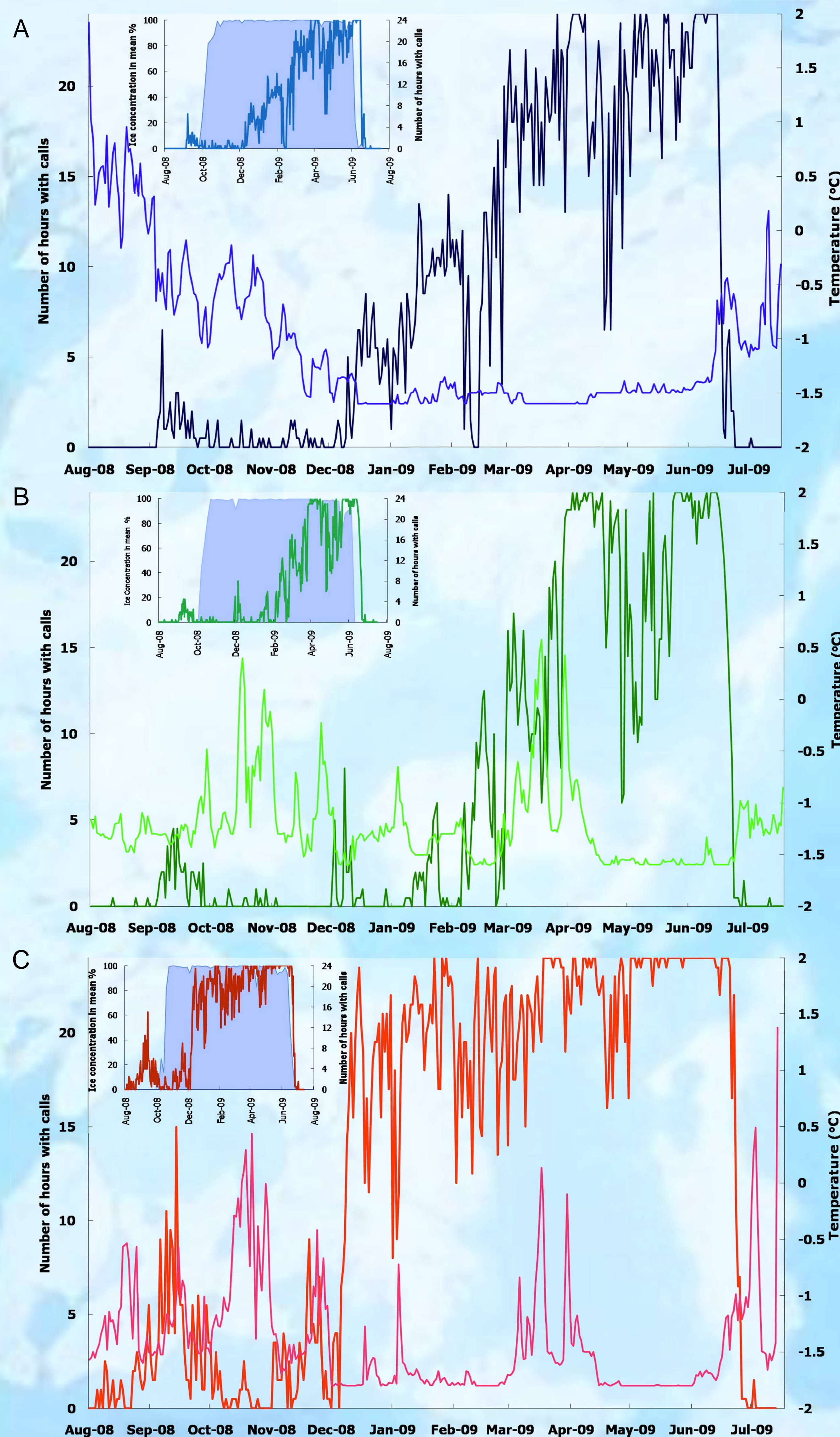


Figure 3. To obtain presence-absence of vocalizations, the acoustic data from each site were visually examined for bearded seal calls. The number of hours per day with calls was tallied and plotted with associated temperature data. A) Site W1 (seal data dark blue, temperature data light blue); B) Site A2 (seal data dark green, temperature data light green); C) Site A1 (seal data red, temperature data pink). In general the number of hours with calls is lower with higher water temperatures. The westernmost instrument (A1) had many more hours over a long time period with calls. Mean ice concentration data in a 20 km radius around each site are shown with seal data as insets.

Monthly counts of bearded seal calls from W1

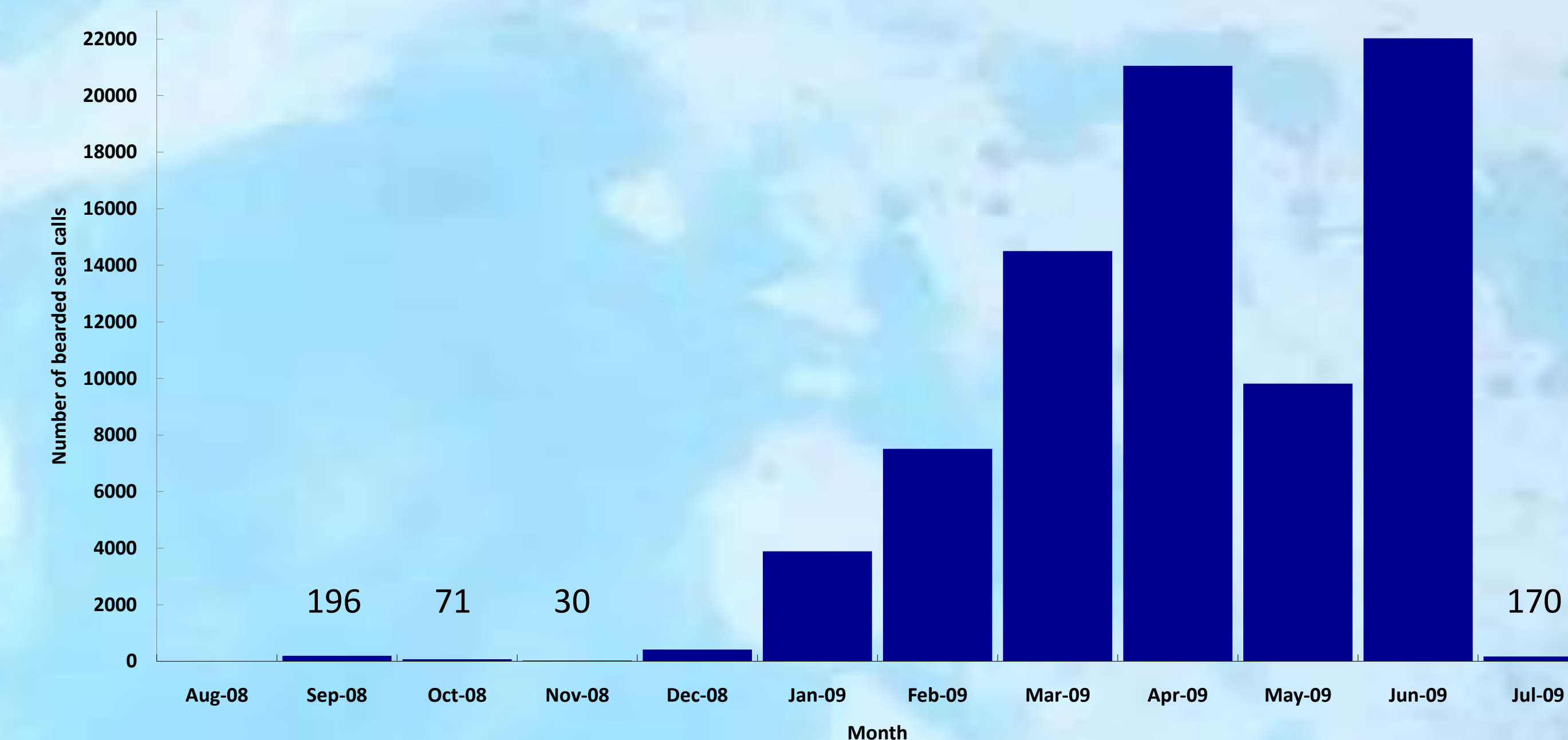


Figure 4. To obtain an estimate of the number of calls per month produced, each file for instrument W1 was examined and bearded seal calls identified. Initially, calls were manually detected in XBAT (xbat.org), but due to the high volume of calls present in nearly every month of the year, a tonal detector that looked for frequency modulated calls between 200-4000 Hz was run in Ishmael (Mellinger, 2002) and detections were verified in XBAT. Automatic detection methods appeared to underestimate the number of calls present by as much as 50% during periods of maximum calling but averaged ~20% for the spring and were close to 0% for months in which there were few calls (late fall and winter). Missed calls were generally low amplitude, likely from distant animals. The dip in May 2009 is not explained by changes in ice concentration (at least not at the 12.5 km resolution of the data we used) and will be investigated further.

Summary

- Bearded seal calls were recorded in all months of the year at all sites with a clear seasonal peak in late winter/early spring
- In general, the number of hours with calls was lower with higher water temperatures
- The westernmost instrument (A1) had many more hours over a longer time period with calls than sites A2 or W1
- The drop off in number of calls per month in May is unexplained
- Bearded seals are the biggest contributor of biological sound year-round in the Beaufort Sea
- In the spring, calling ceased abruptly with seasonal decrease in ice cover suggesting that further decreases in sea ice, especially in spring, may negatively impact the survival of bearded seals due to loss of crucial birthing habitat

Future Directions

- Examine individual calls and call types for geographic and seasonal variations
- Statistically correlate call detections with oceanographic data such as temperature, ice cover and concentration, and currents
- Examine diel patterns in calling
- Look at long term, multi-year data for population trends

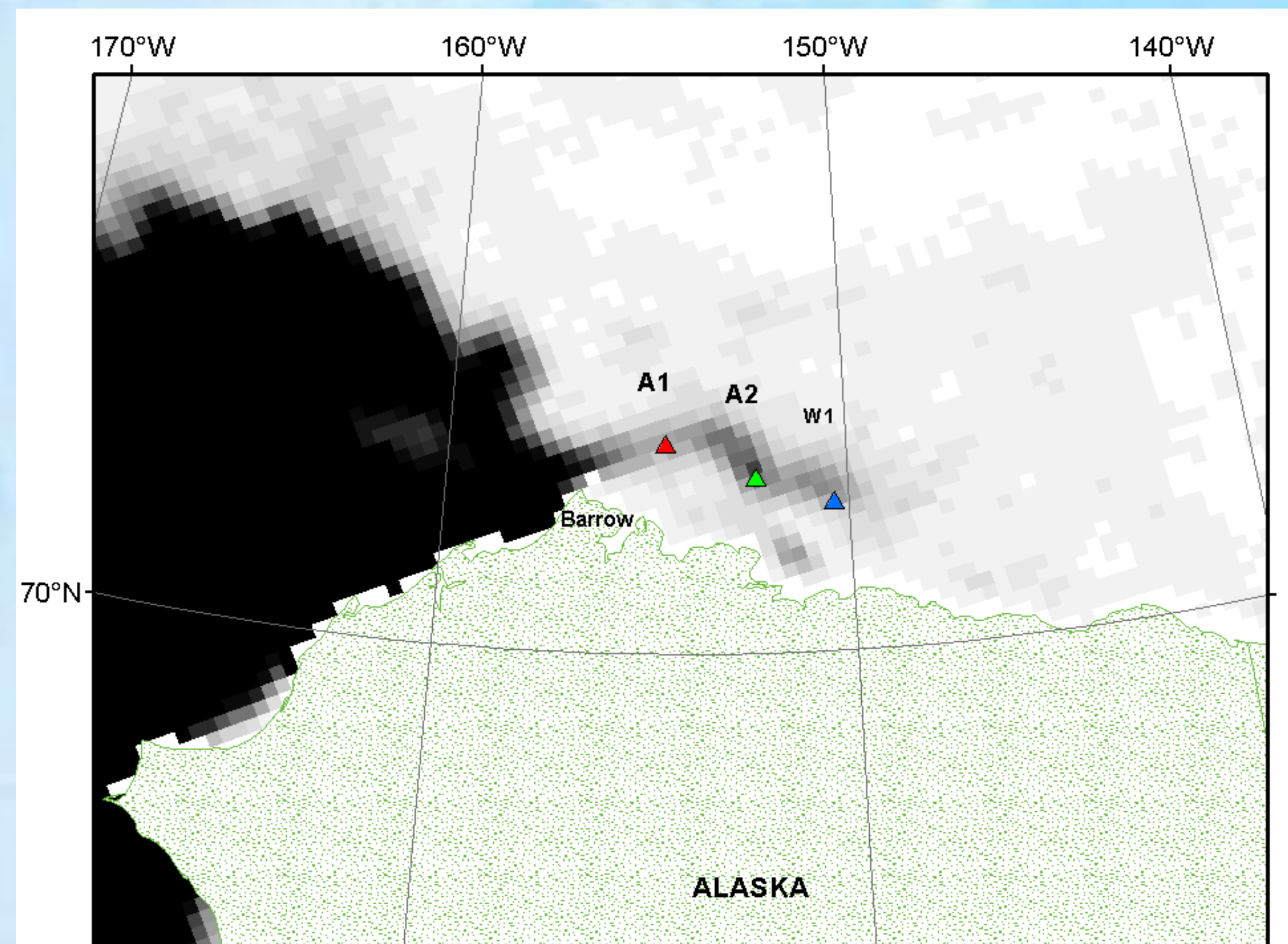


Figure 2. Hydrophone packages were moored at 3 sites (W1, A2, A1) in the western Beaufort Sea from 2008-2009. These instruments (Multi-electronique Aural M2, www.multi-electronique.com) were programmed to sample at 8192 Hz on a duty cycle of 9 min on, 21 min off, for an entire year. Temperature and pressure (depth) were measured for each file time. Two of the instruments (A1 and A2) were moored in ~100 m of water while the third (W1) was in 50 m of water. All were suspended 5 m above the sea floor. The moorings were retrieved in late July 2009. Sea ice imagery from 31 October 2008 shows a lead along the shelf break. Ice concentration data were obtained from the National Snow and Ice Data Center (NSIDC, <http://n4ei01u.ecs.nasa.gov>).

Bearded, ringed, and ribbon seal vocalizations and seasonal presence in the northeastern Chukchi Sea

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Sean Wiggins¹, John Hildebrand¹, and Robert Small⁴



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Introduction

Bearded seals (*Erignathus barbatus*), ringed seals (*Phoca hispida*), and ribbon seals (*P. fasciata*) are three phocid species that inhabit the northeastern Chukchi Sea either seasonally or year around. While all three are ice-breeding seals, there are distinct inter- and intraspecific differences in the ice conditions they prefer and in their manner and timing of habitat use. Mating, parturition, and molting have been well studied in all three species and are known to occur between March and late June. However, there remains much unknown about each species' particular habitat preferences, distributions, and underwater behaviors at other times of year, mainly because of the difficulty of conducting these types of studies in the extreme environmental conditions in the Arctic. Fortunately, bearded, ringed, and ribbon seals produce underwater vocalizations, making them well-suited for study using long-term acoustic recording.

To provide better understanding of Arctic seal seasonal presence, we collected, analyzed and present a three-year time series of acoustic recordings made along the continental slope break, 120km north-northwest of Barrow, Alaska in the Chukchi Sea (Fig 1). Acoustic detections of ringed, bearded, and ribbon seal calls are compared with sea ice concentration to provide insights into the seals' relationships with the ice. We also provide representative spectrograms of their acoustic repertoires recorded at the study site.

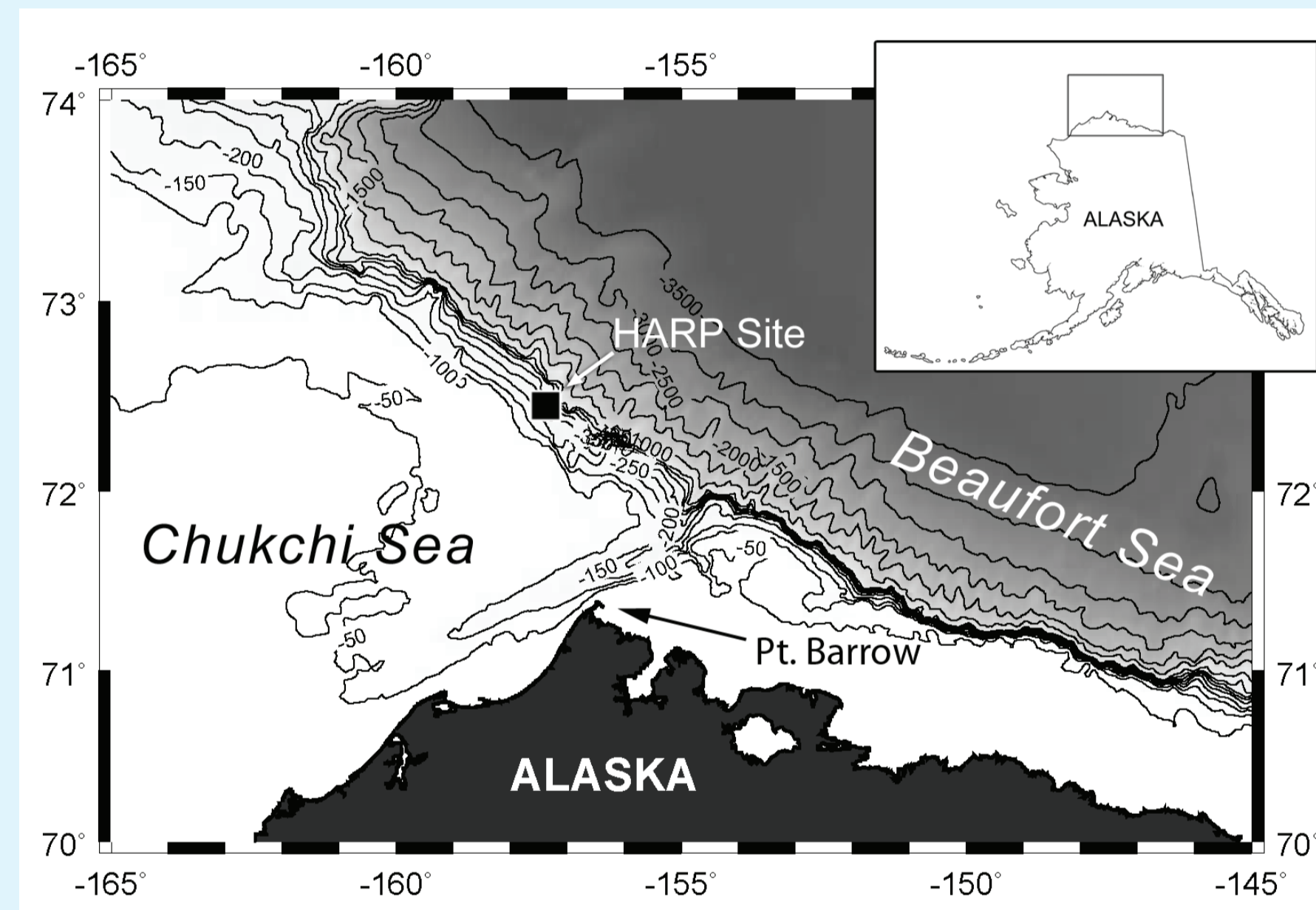
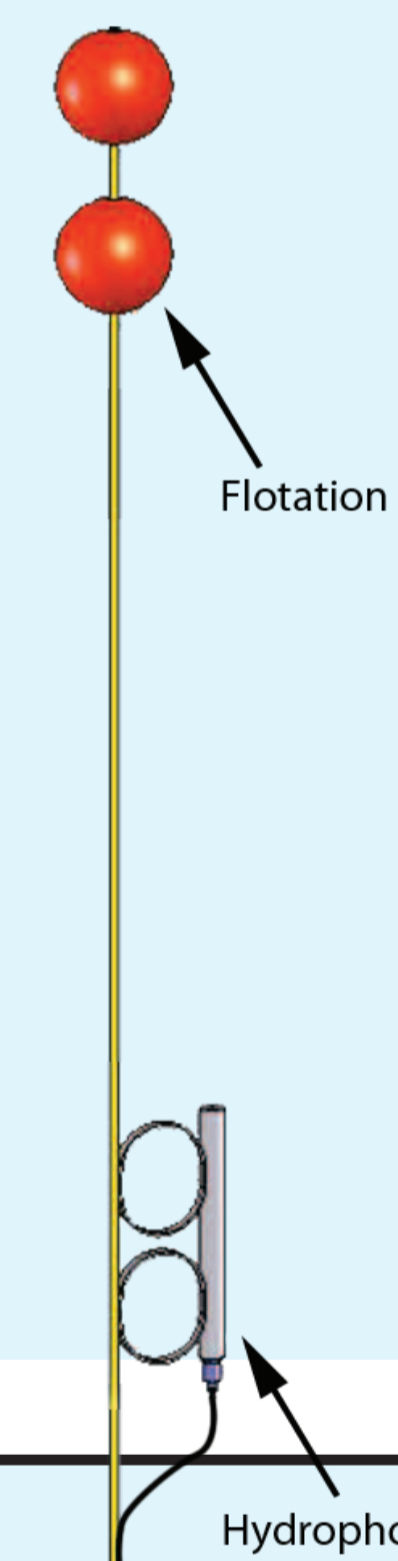


Figure 1. HARP deployment site 120km NNW of Point Barrow, Alaska (lat 72 27.6N lon 157 24.0W). The instrument was deployed to a depth of 240m along the continental slope. Bathymetric contours are in meters.



Goals

- Understand seasonal use of offshore habitat in the northeastern Chukchi Sea by bearded, ringed, and ribbon seals
- Observe their underwater acoustic behavior at times of year during which little research has been conducted to date
- Detail an acoustic repertoire for each of these species at the study site

Methods

- Over-winter autonomous acoustic recording using High-frequency Acoustic Recording Packages, or HARPs (Figure 2)
- Recorded and analyzed acoustic data from September through June of 2006 through 2009 (807 days of recording)
- Long term spectral averages (LTSA) are used for analysis (Figure 3)
- Identification of bearded, ringed, and ribbon seal calls based on previously published acoustic repertoires

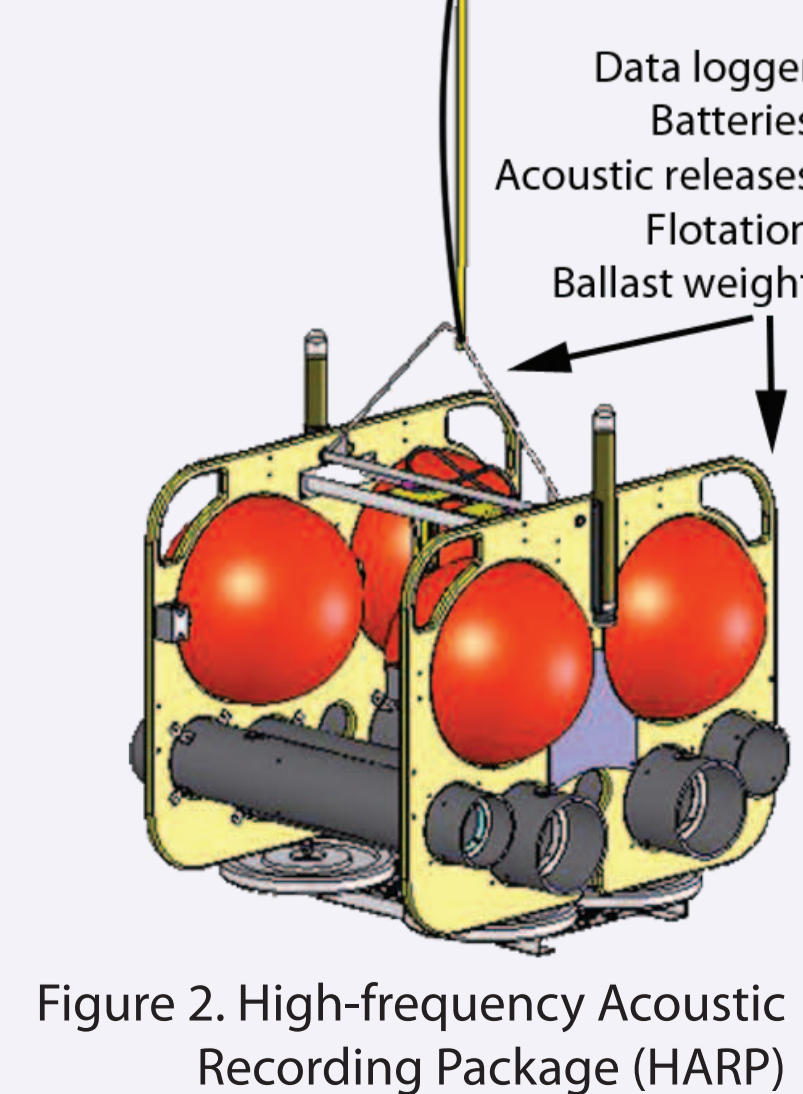


Figure 2. High-frequency Acoustic Recording Package (HARP)

- Long-term spectral averaged files are scanned visually (Figure 3)
- Likely calls are inspected and logged according to species
- Key parameters are logged for all calls of sufficient quality
 - Start time/frequency
 - End time/frequency
 - Minimum and maximum frequencies
- AMSR-E sea ice data (Spreen et al. 2008) processed using WIM (Kahru) for comparison with detections

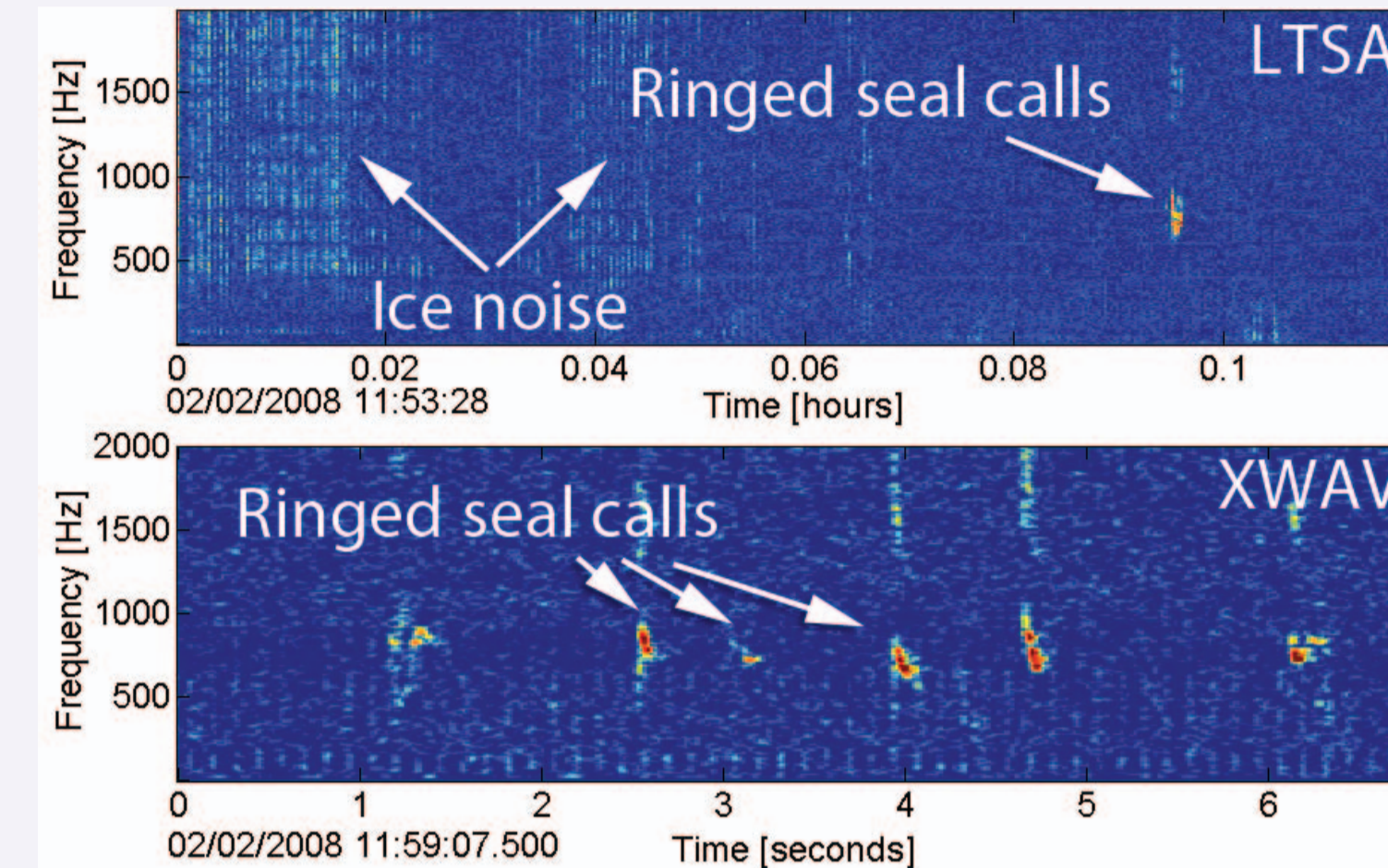


Figure 3. LTSA and XWAV detection windows, showing calls of ringed seals and ice noise

Results



Bearded seal
Photo: Mike Cameron, NOAA-NMFS



Ringed seal
Photo: Brendan P. Kelly, NOAA-NMFS



Ribbon seal
Photo: Mike Cameron, NOAA-NMFS

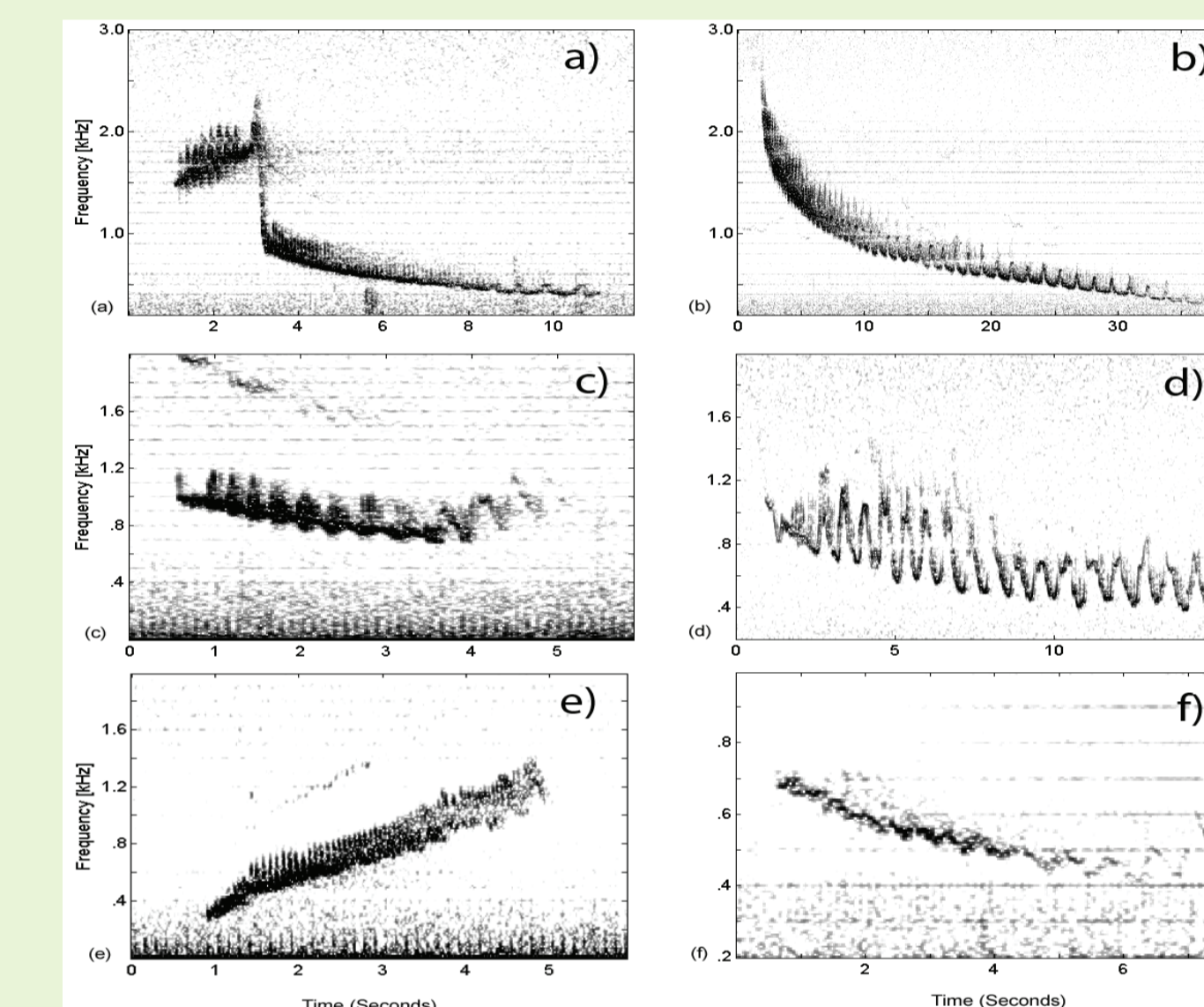


Figure 4. Bearded seal call types found in HARP dataset (Risch et al 2007 descriptions in parentheses) a. trill 1 (AL1), b. trill 2 (AL2), c. trill 4 (AL4), d. trill 5 (AL5), e. ascent (AL7), f. moan (AL3)

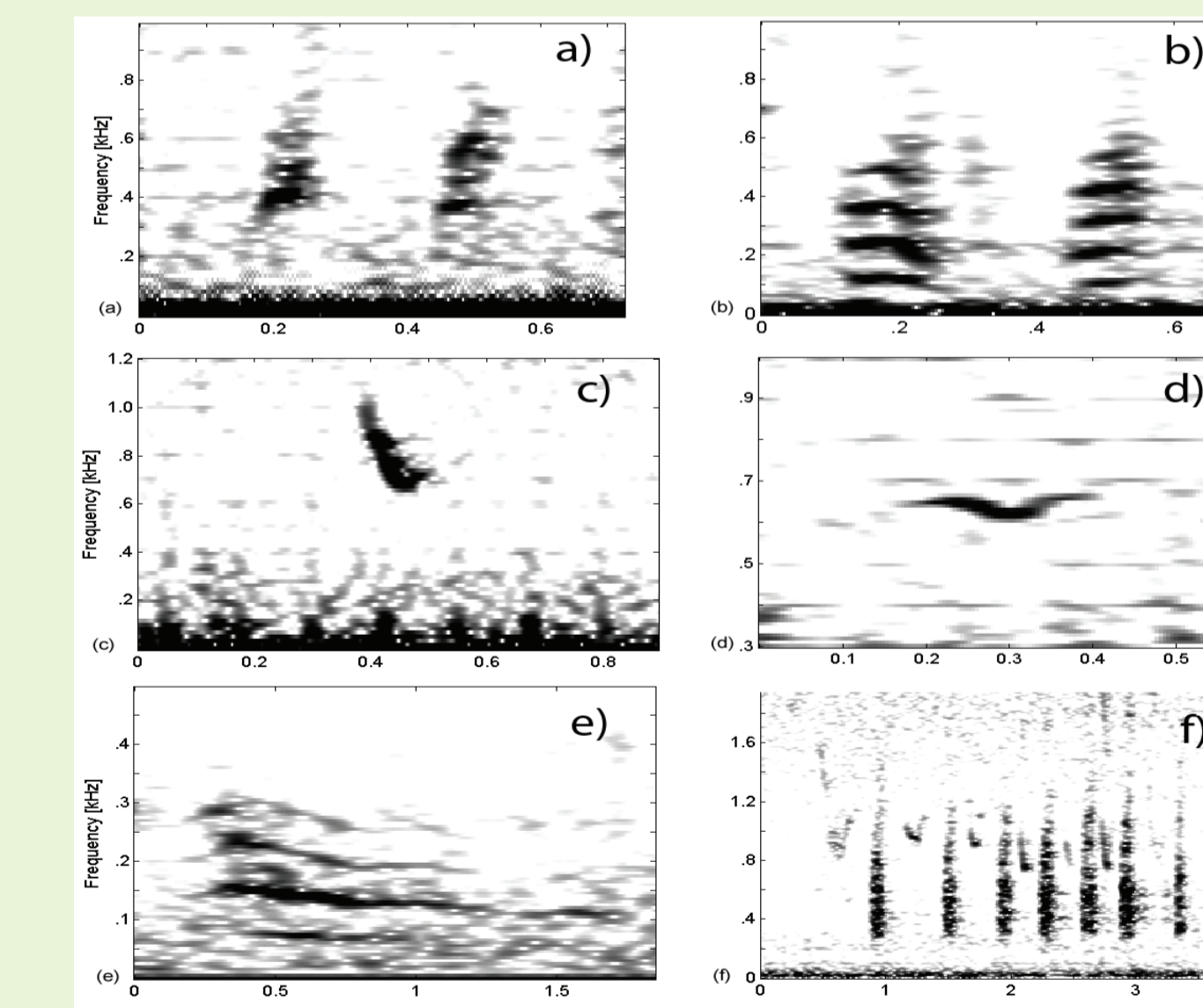


Figure 5. Ringed seal vocalizations found in the HARP dataset: a) medium-frequency bark, b) low-frequency bark, c) yelp, d) chirp, e) growl, f) bark-yelp sequence

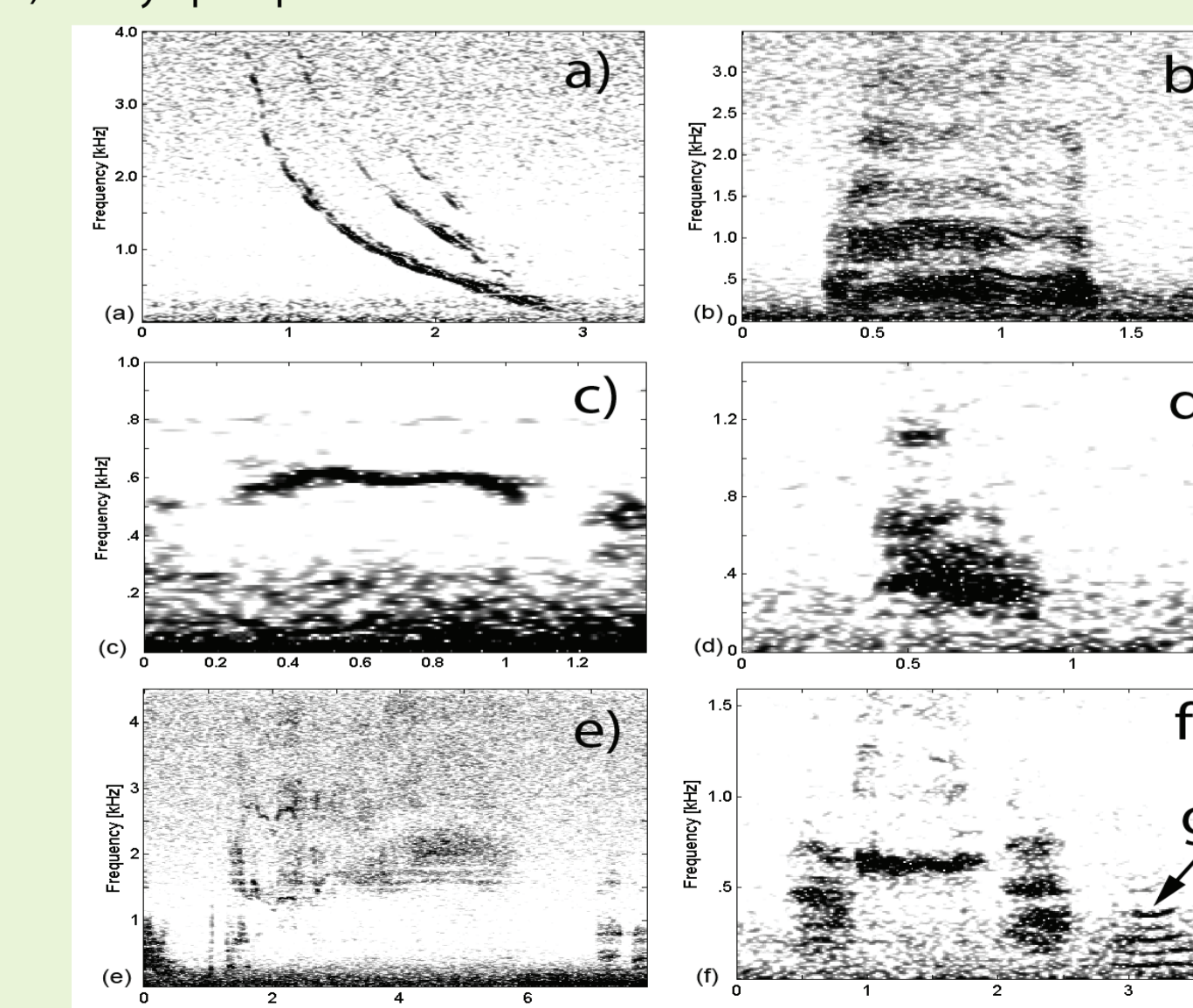


Figure 6. Ribbon seal calls repertoire at the study site: 1) downsweep, b) growl, c) yowl, d) slow bark, e) high-frequency scream, f) stereotyped sequence, g) low-frequency growl

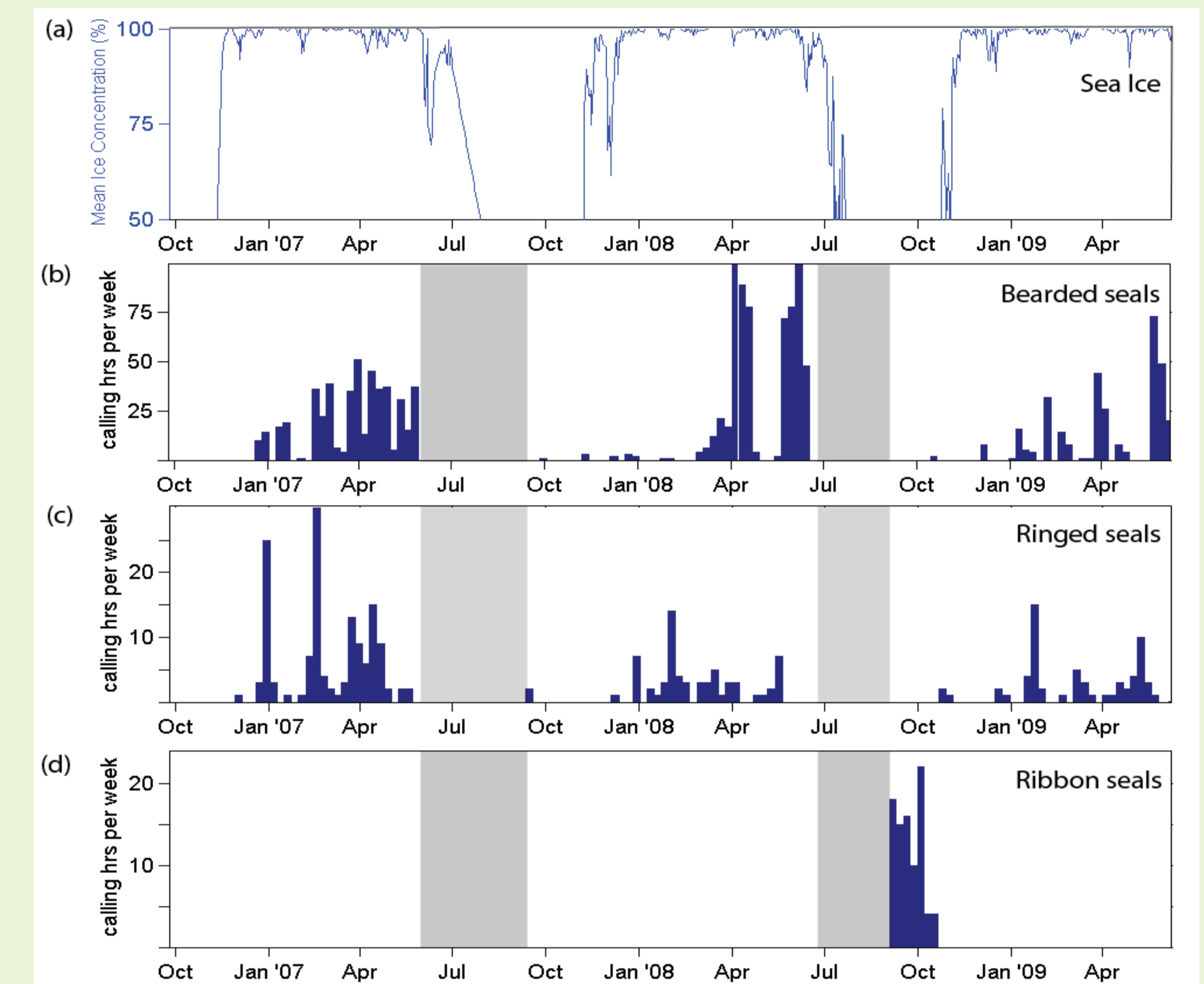


Figure 7. Acoustic detections of ice seal vocalizations from September, 2006 to June, 2009 plotted with sea ice cover: a) AMSR-E mean daily percent sea ice cover (40nm averaged data), b) bearded seals, c) ringed seals, and d) ribbon seals. Shaded areas indicate periods with no acoustic data.

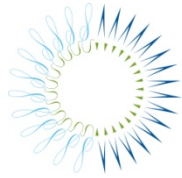
Conclusions

- Acoustic detections provide evidence that offshore Chukchi Sea habitats are a wintertime home and spring breeding ground for bearded and ringed seals.
- In some years, ribbon seals migrate to the northeastern Chukchi slope during open water
- Fall presence of ribbon seals in the Chukchi Sea should be taken into account when planning industrial activity
- Long-term acoustic recording offers an effective tool for studying these species year-round, especially in more remote areas. This method may be helpful in detecting changes in the distribution or behavior of ice seal species across large areas.

Acknowledgements

We thank the Alaska Department of Fish and Game, the Alaska CIAP grant program, and also Craig George and Robert Suydam of the North Slope Borough for providing the funding to make this study possible. Larry Mayer (CCOM/JHC, University of New Hampshire), Bob Pickart (WHOI), Caryn Rea (Conoco-Phillips), the crew of the USCGC Healy, and the crew of the M/V Torsvik provided ship time and invaluable at sea support. We thank the Whale Acoustics Lab at the Scripps Institution of Oceanography. And finally, we thank the Mount Edgecumbe High School teachers and administrators who have supported the SeaTech program, especially Bill Hutton, Randy Hawk, and Bernie Gurule, and the hard working students who have participated in this research.

Contact: Josh Jones: Scripps Institution of Oceanography j8jones@ucsd.edu (858) 822-1836



THE
PEW
CHARITABLE TRUSTS

PEW ENVIRONMENT GROUP

Comments submitted electronically at: itp.guan@noaa.gov

September 12, 2011

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

Dear Mr. Payne,

The Pew Environment Group respectfully submits the following comments on the National Marine Fisheries Service (NMFS) Notice on proposed incidental harassment authorization (IHA) for ION Geophysical.

We believe that decisions about whether, where, and how oil and gas activities, including seismic activity, are conducted in the U.S. Arctic Ocean must be based on sound scientific information, thoughtful planning, and with the full involvement of the people most affected. This IHA is unprecedented because it proposes seismic activity during freeze up and darkening conditions (October – December).

We have several concerns with the proposed IHA for ION Geophysical. Firstly, the information on which NMFS is basing the amount of animals that may be impacted by this activity is not the best available data as most surveys have been conducted during the open water season and usually conclude by October. Secondly, this is the first time NMFS is considering permitting an IHA to authorize Level A harassment in the Arctic Ocean; therefore, NMFS needs to ensure that the best science is used. Thirdly, given the degree of uncertainty, NMFS should be using area closures to protect the most sensitive habitat important for ecological functioning and subsistence way of life.

NMFS should use a precautionary approach given the lack of surveys conducted outside of the open water period. Sound is vital to survival of marine mammals as they use it to detect their environment and communicate with one another. The U.S. Geological Survey (USGS)¹ highlighted that the type of information needed to make decisions about the impact of offshore activity

¹ Holland-Bartels, L. and Pierce, B., eds. 2011. An evaluation of science needs to inform decisions on Outer Continental Shelf energy development in the Chukchi and Beaufort Seas, Alaska: U.S. Geological Survey Circular 1370. 278 pp.

(e.g., seismic noise) on marine mammals remains largely lacking.² A significant unknown is the degree to which sound impacts marine mammals at the individual level or population level. Because of these types of concerns, NOAA committed to undertaking efforts to get at the potential impacts of anthropogenic activity, including oil and gas exploratory activity.³ And, these efforts appear to currently exist in exploratory and initial phases of mapping sound.⁴

To complicate matters, much of the baseline data about individual species (e.g., population dynamics and seasonal abundance) remains a noteworthy gap.⁵ In particular, much of what NMFS has compiled to date has been collected during the summer open water season.⁶ The proposed activity will be conducted from October through December 2012 in the Beaufort and Chukchi seas outside of the time period during which most studies have occurred and for which there is little scientific information available. It is this incomplete baseline that NMFS uses as their basis for comparing the potential impacts during this time of the year. The uncertainty associated with these determinations requires that NMFS follow a precautionary approach.

The Marine Mammal Protection Act (MMPA) also demands a precautionary approach. The MMPA does not require NMFS to fill every information gap, but it does require NMFS to err on the side of caution.⁷ For example, NMFS has an affirmative obligation to find that impacts are no more than “negligible” and limited to the harassment of only “small numbers” of marine mammals.⁸ In making these determinations, NMFS must give the benefit of the doubt to the species. The MMPA was “deliberately designed to permit takings of marine mammals only when it was known that that taking would not be to the disadvantage of the species.”⁹

This is the first time NMFS is considering approving authorizations in these conditions. The proposed activity by ION Geophysical will occur from October 1 through December 15 in the Beaufort and Chukchi seas during a period of increasing sea ice concentration, decreasing light, and, eventually, complete darkness. We do not think NMFS should be setting a precedent by authorizing Level A harassment with an IHA for bowhead whale, beluga whales, and ringed seals without adequate environmental analysis. With the increased periods of darkness and presence of sea ice, typical mitigation measures applied during the open water period are not effective. Clearly, more environmental analysis is necessary before seismic should be approved during this time period and under these conditions. For example, more data is needed on marine mammal use outside of the open water period when surveys are usually conducted.

² See Hutchinson and Ferrero. 2011. Chapter 6. Marine mammals and anthropogenic noise, pages 165-202 in Holland-Bartels and Pierce 2011

³ Letter from NOAA Administrator Dr. Jane Lubchenco to Council on Environmental Quality Chair, Nancy Sutley, dated January 19, 2010.

http://www.st.nmfs.noaa.gov/cetsound/documents/Lubchenco_Sutley%20letter.pdf

⁴ Underwater Sound Field Working Group, <http://www.st.nmfs.noaa.gov/cetsound/sound.html>

⁵ Holland-Bartels and Pierce, 2011.

⁶ Cetacean Data Availability from NMFS Cetacean Density and Distribution Mapping Working Group <http://www.st.nmfs.noaa.gov/cetsound/cda.html> (last accessed 13 September 2012)

⁷ e.g. Congress enacted the MMPA to manage marine mammals “for their benefit and not for the benefit of commercial exploitation.” H. Rep. No. 92-707, reprinted in 1972 U.S.C.C.A.N., 1972, pp. 4144–45.

⁸ 16 U.S.C. § 1371(a)(5)(D).

⁹ Comm. for Humane Legislation v. Richardson, 540 F.2d 1141, 1150 (DC Cir. 1976).

NMFS should exclude important habitat from the survey area and institute time- and place-based restrictions before permitting activities. Before, permitting activities met with a high degree of scientific uncertainty. NMFS should ensure that, based on current knowledge, the most important habitat essential for both ecological functioning and maintaining important subsistence use areas is protected.

During the Bureau of Ocean Energy Management (BOEM) 2012-2017 Proposed Program and NMFS Programmatic Environmental Impact Statement (EIS) comment period, we submitted existing and publicly available subsistence hunting information for deferral recommendations including hunting areas for bowhead whale, beluga whale, polar bear, seals, walrus, and waterfowl. The data documented local subsistence use throughout an area 25 miles to over 100 miles offshore of six villages on the Arctic coastline. When assembled on a single map, the data showed the extent of hunting areas for the six Arctic coastal communities (see Attachment A, Map 1, "Important Subsistence Areas"). NMFS should exclude the important subsistence use areas depicted in Map 1 from oil and gas activities as described in the Draft EIS. Attachment A describes in more detail these subsistence areas, their importance to communities, and the reasons they should be permanently deferred.

Among scientists, there is general consensus that time and/or place restrictions designed to protect high value habitat are one of the most effective means to reduce the potential impacts of noise and disturbance.¹⁰ The current understanding of ecological functioning in the Chukchi and Beaufort seas indicates that a number of sensitive marine habitats are especially important to the region's ecological functioning. Please see Attachment A for areas that we've previously identified as being ecologically significant and submitted to BOEM. These areas should be excluded from future activity and include, among others, Hanna and Herald shoals, Barrow Canyon, and the Chukchi Sea ice lead system (see Attachment A, Map 7, "Proposed Deferral Areas and Seasonal Restrictions"). NMFS should exclude these ecologically important areas from the proposed activity. In the absence of population dynamics data on marine mammal species, deferring these areas will ensure a precautionary approach.

These areas would complement the work currently being undertaken by NMFS. NMFS currently has information about Biologically Important Areas (BIAs) for certain Cetacean species during the open water period. This effort should be broadened to include BIAs for important marine mammal species such as ringed seal, bearded seal, polar bear, and walrus.¹¹

As noted above, existing information justifies deferral for areas like Hanna and Herald Shoals, Barrow Canyon, and the Chukchi Sea ice lead system. Excluding these areas from activity described in this Draft EIS is necessary, but it is not sufficient over the long-term. Identification of important ecological areas should be an ongoing part of an integrated, long-term scientific research and monitoring program for the Arctic, not a static, one-time event. As an Arctic research and monitoring program gives us a greater understanding of the ecological functioning of Arctic waters, it may reveal additional important ecological areas that BOEM and NMFS

¹⁰ See, e.g., Agardy, T., and 17 others 2007. A global scientific workshop on spatio-temporal management of noise. Report of workshop held in Puerto Calero, Lanzarote, June 4-6, 2007.; ECS Working Group. 2009. Technical report on effective mitigation for active sonar and beaked whales, working group convened by European Cetacean Society.; OSPAR Commission, Assessment of the environmental impact of underwater noise (report issued as part of OSPAR Biodiversity Series, London, UK.).

¹¹ See: <http://www.st.nmfs.noaa.gov/cetsound/important.html>.

should exclude from future lease sales and other oil and gas activities. Further justification for this action comes from the Department of the Interior (DOI) announcement on February 17, that the Interagency Arctic Working Group will pursue “implementation of an ecosystem-based management framework for the Alaska Arctic that would focus on particularly important ecological areas that support special wildlife, land or water resources, as well as areas important for the subsistence and culture of local communities.”¹²

Traditional Knowledge needs to be better incorporated

NMFS could do a better job incorporating traditional knowledge into their analysis. Traditional knowledge could help inform the use of the Beaufort and Chukchi seas by marine mammals during a time period for which there is very little survey effort by government agencies or institutions. Furthermore, in past open water¹³ meetings that we’ve attended, there has been concern voiced publicly by marine mammal hunters about the interruption of the newly forming ice by vessels and ice breakers. NMFS has stated that there will be “no significant modification to marine habitat.”¹⁴ Given the concern from local communities, NMFS might consider addressing some of the concerns about the impact this activity may have on the food web from the disturbance of early ice formation.

Conclusion

Oil and gas activities are expanding rapidly in the Beaufort and Chukchi seas. Additionally, commercial shipping and vessel traffic are increasing in Arctic waters as summer sea ice retreats. This growth in industrial activities comes at a time when a rapidly changing climate is causing profound changes to the region, and when ocean acidification will contribute additional stress to marine ecosystems. The potential impacts of these industrial activities and environmental changes—both individually and cumulatively—demand a comprehensive approach towards managing our Arctic Ocean resources. We appreciate the opportunity to provide comments. In the meantime please do not hesitate to contact us for additional information or clarification.

Sincerely,



Marilyn Heiman
Director
U.S. Arctic Program
Pew Environment Group

¹² See Department of the Interior News Release, “Obama Administration Announces Major Steps toward Science-Based Energy Exploration in the Arctic: BSEE Issues Approval for Shell Chukchi Sea Oil Spill Response Plan (Feb 17, 2012).

¹³ <http://www.nmfs.noaa.gov/pr/permits/openwater.htm>

¹⁴ Takes of marine mammals incidental to specified activities; taking marine mammals incidental to marine seismic survey in the Beaufort and Chukchi seas, Alaska. Federal Register, Vol. 77, No 160, August 17, 2012, page 49956.