Marine Mammal Commission

23 July 2014

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

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application submitted by the U.S. Geological Survey (USGS), Lamont-Doherty Earth Observatory (LDEO), and National Science Foundation (NSF) seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act (the MMPA) to take small numbers of marine mammals by harassment. The taking would be incidental to a marine geophysical survey to be conducted off the east coast of the United States. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 23 June 2014 notice announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (79 Fed. Reg. 35642).

Some issues raised in previous letters regarding geophysical surveys reflect Commission concerns that apply more broadly to incidental take authorization applications beyond USGS's proposed application. The Commission has recommended numerous times that NMFS adjust density estimates using some measure of uncertainty when available density data originate from different geographical areas and temporal scales and that it formulate policy or guidance shaping a consistent approach for how applicants should incorporate uncertainty in density estimates. NMFS has indicated that it is currently evaluating available density information and working on guidance that would outline a consistent approach for addressing uncertainty in specific situations where certain types of data are or are not available (78 Fed. Reg. 57354). Further, the Commission has recommended that NMFS follow a consistent approach of requiring the assessment of Level B harassment takes for specific types of sound sources (e.g., sub-bottom profilers, echosounders, side-scan sonar, and fish-finding sonar) by all applicants who propose to use them. NMFS has indicated that it is evaluating the broader use of those types of sources to determine under what specific circumstances requests for incidental taking would be advisable (or not) and also is working on guidance that would outline a consistent approach for addressing potential impacts from those types of sources (78 Fed. Reg. 57354). The Commission welcomes the opportunity to meet with NMFS to review these higher-level recommendations, as well as those specific to USGS's application.

BACKGROUND

USGS, with LDEO as the operator, proposes to conduct a high-energy, 2D geophysical survey in the U.S. exclusive economic zone (EEZ) and international waters of the northwest Atlantic Ocean from New England to Florida. The purpose of the proposed survey is to identify the outer limits of the U.S. continental shelf and study the sudden mass transport of sediments down the continental shelf that may pose significant tsunami-related hazards to Atlantic and Caribbean coastal communities. The survey would be conducted in waters estimated to be 1,400 to greater than 5,400 m in depth with approximately 3,165 km of tracklines during both phase I (up to 18 days in August–September 2014) and phase II (up to 18 days between April and August 2015). LDEO would use the R/V *Marcus G. Langseth*, owned by NSF, to operate a 36-airgun array (nominal source levels 236 to 265 dB re 1μPa (peak-to-peak)) at 9 m depth. The *Langseth* also would tow one hydrophone streamer, 8,000 m in length, during the survey. In addition, LDEO would operate a 10.5- to 13-kHz multibeam echosounder and a 3.5-kHz sub-bottom profiler continuously throughout the survey.

NMFS preliminarily has determined that, at most, the proposed activities would result in a temporary modification in the behavior of small numbers of up to 34 species of marine mammals and that any impact on the affected species would be negligible. NMFS does not anticipate any take of marine mammals by death or serious injury. It also believes that the potential for temporary or permanent hearing impairment will be at the least practicable level because of the proposed mitigation and monitoring measures. Those measures include monitoring exclusion and buffer zones and using power-down, shut-down, and ramp-up procedures. In addition, USGS would shut down the airguns immediately if and when a North Atlantic right whale is sighted, regardless of the distance from the *Langseth*. Ramp-up procedures would not be initiated until the right whale has not been seen at any distance for 30 minutes. Further, USGS would power down the array, if possible, when concentrations of humpback, sei, fin, blue, and/or sperm whales (six or more individuals that do not appear to be traveling and are feeding, socializing, etc.) are observed within the Level B harassment zone (based on 160 dB re 1 μPa).

Staff members from NMFS, NSF, USGS, LDEO, and the Commission met in March 2013 to discuss some of the Commission's ongoing concerns regarding the potential effects of geophysical surveys. Although a number of concerns were discussed and several resolved, the following sections highlight areas that, in the Commission's view, warrant further attention.

RATIONALE AND RECOMMENDATIONS

Uncertainty in estimating exclusion and buffer zones

The Commission continues to have concerns regarding the method used to estimate exclusion and buffer zones (based on Level A and B harassment, respectively) and the numbers of takes for USGS- and NSF-funded geophysical research. These concerns date back to 2010 (please refer to the Commission's 12 March, 19 April, and 24 June 2013 and 31 March 2014 letters for detailed rationale). Briefly, LDEO performs acoustic modeling for geophysical research conducted by the *Langseth*. For at least 6 years (and likely more than the last 10 years), LDEO has estimated exclusion and buffer zones using a simple ray trace–based modeling approach that assumes spherical

spreading, a constant sound speed, and no bottom interactions (Diebold et al. 2010). That model does not incorporate environmental characteristics of the specific study area including sound speed profiles and refraction within the water column, bathymetry/water depth, sediment properties/bottom loss, or absorption coefficients. However, LDEO continues to believe that its model generally is conservative when compared to in-situ sound propagation measurements of the R/V *Maurice Ewing*'s arrays (i.e., 6-, 10-, 12-, and 20-airgun arrays) and the R/V *Langseth*'s 36-airgun array from the Gulf of Mexico (Tolstoy et al. 2004, Tolstoy et al. 2009, Diebold et al. 2010[1]). LDEO also has noted the model is most directly applicable to deep water (> 1,000 m). Diebold et al. (2010) noted the limited applicability of LDEO's model when sound propagation is dependent on water temperature, water depth, bathymetry, and bottom-loss parameters. They further indicated that modeling could be improved by including realistic sound speed profiles within the water column. In addition, Tolstoy et al. (2009) acknowledged that sound propagation depends on water depth, bathymetry, and tow depth of the array and that sound propagation varies with environmental conditions and should be measured at multiple locations.

LDEO has stated that the model for deep water overestimates the received sound levels at a given distance but is still valid for defining exclusion zones at various tow depths. However, LDEO indicated in Appendix A of the environmental assessment for the proposed survey that the calibration data show that at greater distances (4 to 5 km) sound reflected from the sea floor and refracted from the sub-seafloor dominate, while the direct arrivals become weak and/or incoherent (Figures 11, 12, and 16 in Appendix H of the NSF/USGS programmatic environmental impact statement for geophysical surveys (PEIS)). LDEO stated that aside from local topography effects, the region around the critical distance (~5 km in Figures 11 and 12 and ~4 km in Figure 16 in Appendix H of the NSF/USGS PEIS) is where the observed sound levels rise very close to the mitigation model curve. Although the observed sound levels occur primarily below the mitigation model curve, that finding further substantiates the fact that the model is not necessarily indicative of site-specific environmental conditions, including bathymetry and sound speed profiles. The reflective/refractive arrivals are the very measurements that should be accounted for in site-specific modeling and ultimately determine underwater sound propagation. Ignoring those factors is a serious flaw of LDEO's model. Furthermore, the estimated exclusion zones for the proposed survey (36-airgun array towed at 9 m in depth) are smaller[2] than previously authorized and the buffer zones are larger[3] than previously authorized (75 Fed. Reg. 44770; 76 Fed. Reg. 75525, 49737; 77 Fed. Reg. 25693, 41755). This is a bit perplexing as the Commission is unaware of any changes to LDEO's model[4]. All these shortcomings reinforce the Commission's ongoing concerns regarding the estimation of exclusion and buffer zones for USGS- and NSF-funded geophysical surveys.

Those concerns are based primarily on the failure to verify the use of LDEO's model under the specific environmental conditions that would be encountered with each survey. For that reason, the Commission has recommended that NMFS or the relevant entity estimate exclusion and buffer zones using either empirical measurements from the particular survey site <u>or</u> a model that accounts

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[1] Diebold et al. (2010) also presented data on the 18-airgun array from the Gulf of Mexico.
[2] 286 vs. 400 m for the 190-dB re 1 μPa threshold and 927 vs. 940 m for the 180-dB re 1 μPa threshold.
[3] 5,780 vs. 3,850 m for the 160-dB re 1 μPa threshold.
[4] Appendix H of the PEIS has been used in support of LDEO's model since it was available for public review in 2010 and, to the Commission's knowledge, has been unchanged since that time. Those figures have included the maximum sound pressure level trajectories and have been based on sound exposure levels, with a presumed 10 dB difference for sound pressure levels.

for the conditions in the proposed survey area. The model should incorporate operational parameters (e.g., tow depth, source level, number/spacing of active airguns) and site-specific environmental parameters (e.g., sound speed profiles, refraction in the water column, bathymetry/water depth, sediment properties/bottom loss, and wind speed). In March 2013, LDEO indicated that it might be able to compare its model to hydrophone data collected during previous surveys in environmental conditions other than those in the Gulf of Mexico[5] (i.e., deep and intermediate waters in cold water environments that may have surface ducting conditions, shallow-water environments, etc.). The Commission understands that LDEO has been analyzing hydrophone data from waters off Washington State to allow comparisons of empirically derived estimates to model-estimated exclusion and buffer zones, but those results do not appear to have been published yet. The Commission is pleased to hear of this work but encourages LDEO to make such comparisons at various sites, not just in waters off Washington, if it intends to continue using a model that does not incorporate site-specific parameters. The Commission recommended in its 24 June 2013 letter that such comparisons be made prior to submitting applications for geophysical surveys to be conducted in 2014. The Commission further recommended that if LDEO and NSF either do not have enough data to compare LDEO's modeled results to other environments, or choose not to assess the accuracy of the model, then they should re-estimate the exclusion and buffer zones and associated takes of marine mammals using site-specific parameters (including sound speed profiles, bathymetry, and bottom characteristics) for all future applications that use LDEO's model. Neither approach was used for the proposed incidental harassment authorization.

NMFS has indicated that NSF, LDEO, and other relevant entities (USGS, Scripps Institution of Oceanography (Scripps)) are providing sufficient scientific justification for their take estimates. The Commission disagrees with this conclusion, given that the estimates are based on LDEO's model or empirical measurements in the Gulf of Mexico, while recent activities would occur in areas such as the North Atlantic and the Antarctic. Environmental conditions in waters off New Jersey (up to 1,500 m in depth) indicate a surface duct at 50 m, in-water refraction, and bathymetry and sediment characteristics that reflect sound in summer. Further, conditions near the mid-Atlantic ridge (up to 5,000 m in depth) indicate a pronounced sound channel at approximately 1,000 m depth and a downward-refracting stratified surface layer in summer, with nearly identical sound speed profiles in spring and fall[6]. Although a surface duct likely is present in the proposed survey area, none of the site-specific parameters are accounted for in LDEO's model[7].

In a recent sound exposure modeling workshop that was attended by numerous entities (including NMFS, NSF, LDEO, USGS, and the Commission), experts confirmed that sound speed profiles and bathymetry/sediment characteristics were the most important factors affecting

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[5] Diebold et al. (2010) supported such an approach, stating that streamer data can provide an accurate assessment of sound exposure levels at the relevant ranges for mitigation in shallow-water environments (≤ 100 m). They further indicated it seems logical and advantageous that those data be monitored in real time to fine tune a priori mitigation zones in shallow-water environments.

[6] NSF and USGS's PEIS included environmental data from the continental shelf close to the proposed survey.

[7] NMFS has acknowledged that although the acoustic energy within the third and fourth lobes (330–667 Hz) of the impulsive waveform would be trapped in the surface duct and propagated to greater distances, those lobes represent only a fraction of the total acoustic energy (specifically for the LDEO New Jersey survey; 79 Fed. Reg. 38500). The Commission notes that the impulsive waveform includes sound energy in frequencies even greater than 667 Hz, including contributions from mid- and high-frequency sound that may be trapped in the surface duct and propagated further than sound below 330 Hz.

underwater sound propagation and should be included in related modeling. While LDEO presented various aspects of its model during the workshop and indicated that the model was fast, inexpensive, and simple to use, none of those attributes support its applicability or accuracy. Further, LDEO indicated that the model is more closely related to a source model that compares airgun arrays and that it is not representative of modeling in the actual environment. Therefore, the Commission remains concerned that the LDEO model is not based on best available science and does not support its continued use. For all of these reasons, the Commission recommends that NMFS (1) require USGS, LDEO, and NSF to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific parameters (including sound speed profiles, bathymetry, and sediment characteristics at a minimum) for the proposed incidental harassment authorization and (2) impose the same requirement for all future incidental harassment authorizations submitted by USGS, LDEO, NSF, Scripps, Antarctic Support Contract (ASC), or any other related entity.

In 2011[8], NSF and USGS modeled sound propagation under various environmental conditions in their PEIS. LDEO and NSF (in cooperation with Pacific Gas and Electric Company) also used a similar modeling approach in the recent incidental harassment authorization application and associated environmental assessment for a geophysical survey of Diablo Canyon in California (77 Fed. Reg. 58256). These recent examples indicate that LDEO, NSF, and related entities are able to implement the recommended modeling approach, if required to do so by NMFS. The Commission understands the constraints imposed by the current budgetary environment, but notes that other agencies that contend with similar funding constraints incorporate modeling based on site-specific parameters. USGS, LDEO, NSF, and related entities (ASC, Scripps) should be held to that same standard. NMFS recently indicated that it does not, and does not believe it is appropriate to, prescribe the use of any particular modeling package (79 Fed. Reg. 38499). The Commission agrees that NMFS should not instruct applicants to use specific contractors or modeling packages, but it should hold applicants to the same standard, primarily one in which site- and operation-specific environmental parameters are incorporated into the models.

NMFS further indicated that based on empirical data (which illustrate the LDEO model's conservative exposure estimates for the Gulf of Mexico and preliminarily off Washington), it found that LDEO's model effectively estimates sound exposures or number of takes and represents the best available information for NMFS to reach its determinations for the authorization. However, for the survey off New Jersey, NMFS increased the exclusion zone radii by a factor of 50 percent (equivalent to approximately a 3-dB difference in received level at the zone edge) to be additionally precautionary (79 Fed. Reg. 38499). The Commission must question, if NMFS really believes the LDEO model is based on best available science, why it then extended the exclusion zones to be precautionary and if NMFS felt the need to be precautionary and extend the exclusion zones, why it did not then also extend the buffer zones and thus the estimated numbers of takes of marine mammals.

Density estimates

In estimating the numbers of potential takes for the proposed incidental harassment authorization, USGS used density data from the Ocean Biogeographic Information System Spatial

[8] The record of decision was signed in 2012.

Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP), specifically data originating from Navy Operating Area Density Estimates (NODE). USGS considered those estimates to be the best available data. However, those data apply only to the U.S. EEZ, which comprises only 20 percent of the proposed survey area in 2014 and 10 percent in 2015. It is unclear if USGS assumed the densities in areas outside the U.S. EEZ to be 0, if it applied the densities estimated for waters within the EEZ to those other areas, or if it did some permutation of those two methods[9]. In any case, the densities could have been underestimated.

Although NMFS indicated in the *Federal Register* notice for the proposed authorization that the OBIS-SEAMAP data were determined to be the best available information for density data, the Commission understands that NMFS subsequently determined that the data from the Navy's Atlantic Fleet Training and Testing Navy Marine Species Density Database (AFTT NMSDD) are superior and are now considered the best available. Therefore, the Commission understands that NMFS intends to use the AFTT NMSDD data to re-estimate the numbers of marine mammals that could be taken during the proposed survey. The Commission agrees that the AFTT NMSDD data are preferable and should be used to re-estimate the numbers of takes for all marine mammal species and used for the analyses required under both the MMPA and the Endangered Species Act (the ESA). Furthermore, the Commission recommends that the same methods be used to determine the densities for the analyses conducted under the MMPA and ESA.

For some species, the estimated numbers of takes may increase if the AFTT NMSDD data are used. It remains unclear whether any such increases in those estimates would change NMFS's proposed findings as to whether only "small numbers" of marine mammals would be taken or whether such takes would have a "negligible impact" on the affected species and stocks. This is particularly true because NMFS has yet to develop a clear policy setting forth more explicit criteria and/or thresholds for making those determinations, as recommended by the Commission. Such guidance would be particularly useful in a case like this, in which up to 43 percent of the pantropical spotted dolphin stock in the area, or perhaps even more[10], could be taken incidentally during the proposed survey activities. The Commission notes that NMFS, in its proposed authorization, estimated that 6.54 percent of the pantropical spotted dolphin stock would be affected– however, that estimate is based only on the portions of the survey that will occur within the U.S. EEZ. As previously stated, most of the proposed survey would occur in waters outside the EEZ and should be accounted for in both the authorization and the supporting analyses. Is NMFS suggesting that the taking prohibition of the MMPA does not apply to takes by U.S. citizens on the high seas outside the U.S. EEZ or that an incidental take authorization somehow is not needed for activities engaged in by U.S. citizens in those waters? Clearly the taking prohibition applies (see section 102(a)(1)), and, as such, an authorization is needed[11]. Further, that authorization can be issued only if the overall

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[9] USGS's application and environmental assessment indicated the model outputs of all four seasons from the NODE data were used to determine the mean density. However, in further correspondence, USGS indicated that areas beyond the U.S. EEZ were essentially classified as "no data", and median densities were calculated from only areas that had data within the EEZ. Curiously, if one obtains data from the OBIS-SEAMAP website and uses either of those two methods, the data in Table 4 of the *Federal Register* notice (and the relevant tables in the application and environmental assessment) are not reproducible and in some cases are underestimates of the OBIS-SEAMAP data.

[10] Based on the OBIS-SEAMAP data, those takes likely will increase when the takes are re-estimated using the AFTT NMSDD data.

[11] For previous incidental harassment authorizations for LDEO surveys conducted only in international waters of the North Atlantic, NMFS based its small numbers determination on the abundance of the regional population, most of

impact of the taking would be negligible and involve only small numbers of marine mammals. Accordingly, the Commission recommends that NMFS make its small numbers and negligible impact determinations based on the total numbers of marine mammals to be taken for the entire survey (including the combined 2014 and 2015 survey legs), both in the U.S. EEZ and in international waters. The Commission understands that NMFS is in the process of developing both a clearer policy to outline the criteria for determining what constitutes "small numbers" and an improved analytical framework for determining whether an activity will have a "negligible impact" for the purpose of authorizing takes of marine mammals and that NMFS plans to engage the Commission in that process at the appropriate time (79 Fed. Reg. 13626). As previously noted, clearer policies would be especially helpful for reviewing the proposed authorization, and the Commission encourages NMFS to complete its policy development as quickly as possible and awaits a meeting to engage in that policy process.

Under section 101(a)(5)(D)(iii) of the MMPA an incidental harassment authorization can be issued only after notice in the *Federal Register* and opportunity for public comment. However, that public review opportunity is meaningful only if the proposed authorization contains accurate information and the relevant analyses. If, subsequent to publication, substantive changes are made to the underlying information or NMFS's analyses, re-publication with a new comment opportunity is appropriate. In this instance, it appears that NMFS's published analyses were not based on the best available information and that it may have significantly underestimated the likely numbers of takes for at least some of the marine mammal species and stocks that occur in the proposed survey area. That being the case, the Commission recommends that NMFS publish a revised proposed authorization in the *Federal Register* with updated estimated numbers of takes and small numbers and negligible impact analyses to provide a more informed public comment opportunity. Further, the Commission recommends that, to the extent possible, NMFS strive to identify and incorporate any substantive changes that might be made in a proposed incidental harassment authorization prior to publication in the *Federal Register*.

Monitoring measures

In previous letters, the Commission has indicated that monitoring and reporting requirements should be sufficient to provide a reasonably accurate assessment of the manner of taking and the numbers of animals taken by the proposed activity, specifically to verify that only small numbers of marine mammals are being taken and that the impacts are negligible. The Commission continues to believe those assessments need to account for animals at the surface but not detected and for animals present but underwater and not available for sighting, which are accounted for by g(0) and f(0) values. NMFS's most recent response to the Commission's comments indicated that the MMPA implementing regulations require that applicants include monitoring that will result in "an increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities . . ." This increased knowledge of the level of taking could be qualitative or relative in nature, or it could be more directly quantitative (79 Fed. Reg. 38503). The Commission believes that NMFS misinterpreted its implementing regulations in its response. Those regulations state that applicants are to specify—

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which originated from NMFS's stock assessment reports (see Tables 2 in 78 Fed. Reg. 10142 and 78 Fed. Reg. 22249 for the Mid-Atlantic Ridge survey).

> The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities, and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity.

Although this portion of the regulations[12] is not particularly clear, it appears that the phrase "increased knowledge" is intended to modify the clause "of the species" and not "the level of taking or impacts on the populations of marine mammals that are expected to be present while conducting activities". If the phrase "increased knowledge of" is intended to apply throughout the remainder of the provision, as NMFS suggests, then the portion requiring the applicant to provide "suggested means of minimizing burdens…" makes no sense. A better interpretation of the provision is that the applicant is to suggest monitoring and reporting measures that will (1) increase the knowledge regarding the species <u>and</u> (2) provide the necessary information regarding the level of incidental taking that occurs and the impacts of such taking on the affected marine mammal populations. Such an interpretation is consistent with the statutory structure, which under section 101(a)(5)(D)(iv) requires that NMFS "modify, suspend, or revoke an authorization" if it finds, among other things, that the authorized taking is having more than a negligible impact or that more than small numbers of marine mammals are being taken. It is through the prescribed monitoring and reporting requirements that NMFS collects the information necessary to make those determinations. As such, those requirements need to be sufficient to provide accurate information on the numbers of marine mammals being taken and the manner in which they are taken, not merely better information on the qualitative nature of the impacts. Accordingly, the Commission continues to believe that appropriate g(0) and f(0) values are essential for making accurate estimates of the numbers of marine mammals taken during surveys. To be applicable for the proposed survey, the corrections should be based on the ability of the protected species observers to detect marine mammals rather than a hypothetical optimum derived from scientific studies (e.g., from NMFS's shipboard surveys).

Therefore, <u>the Commission again recommends</u> that NMFS consult with USGS, LDEO, NSF, and other relevant entities (e.g., Scripps, ASC) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal takes and the actual numbers of marine mammals taken by incorporating applicable g(0) and f(0) values. NMFS recently stated that although it does not generally believe that post-activity take estimates using f(0) and g(0) are *required* to meet the monitoring requirement of the MMPA, in the context of the NSF and LDEO's monitoring plan, NMFS agreed that developing and incorporating a way to better interpret the results of their monitoring (perhaps a simplified or generalized version of g(0) and f(0)) is a good idea. NMFS further stated it would consult with the Commission and NMFS scientists prior to finalizing the recommendations (79 Fed. Reg. 38503). The Commission welcomes such a meeting.

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[12] The Commission also questions whether the cited regulation is even the relevant one upon which NMFS should be relying. It merely specifies what applicants should be suggesting when applying for an incidental take authorization. NMFS has an independent responsibility under the MMPA to specify monitoring and reporting requirements that are sufficient for it determine that the statutory requirements are being met.

The Commission looks forward to collaborating with NMFS on the various guidance documents and issues raised in this letter. Please contact me if you have questions concerning the Commission's recommendations.

Sincerely,

Rebecca J. Lent

Rebecca J. Lent, Ph.D.
Executive Director

References

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By Electronic Mail

July 23, 2014

Ms. Jolie Harrison
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Email: ITP.Goldstein@noaa.gov

Re: **Comments on the proposed Incidental Harassment Authorization (IHA) for USGS Atlantic Seismic Survey**

Dear Ms. Harrison:

On behalf of our organizations and our more than a million members, we write to submit comments on the proposed Incidental Harassment Authorization (IHA) for the take of marine mammals related to a proposed U.S. Geological Survey, Lamont-Doherty Earth Observatory of Columbia University (L-DEO), and National Science Foundation (NSF) (collectively hereafter USGS) geophysical seismic survey in the Atlantic Ocean off the Eastern Seaboard, August to September 2014 and April to August 2015. 79 Fed. Reg. 35642 (June 23, 2014).

Our organizations are profoundly concerned about NMFS's intention to permit high-intensity seismic surveys in this large Atlantic region—spanning from Massachusetts to South Carolina and covering more than 6,300 km of track lines—because of the significant environmental harm of airgun exploration itself, the sensitivity and endangered status of numerous marine species found within the proposed study area, and the cumulative impact of this and other planned activity in the Atlantic. We are also deeply troubled by the poor analysis undertaken in support of this project, which should have received far more rigorous review.

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 – and USGS's proposed action would degrade the acoustic environment along a significant swath of the Eastern Seaboard. To conduct the survey, USGS plans to tow an array of 36 high-volume airguns behind its ship, firing intense impulses of compressed air—almost as loud as explosives—roughly every 20 seconds, 24 hours per day, for weeks on end. In addition, USGS intends to operate a multi-beam echosounder—a system similar to the one found to have likely caused a mass stranding of melon-headed whales on Madagascar—and a sub-bottom profiler continuously during the seismic operations.

Increasingly, the available science demonstrates that these blasts disrupt baleen whale behavior and impair their communication on a vast scale; that they harm a diverse range of other marine mammals; and that they can significantly impact fish and fisheries, with unknown but potentially substantial effects on coastal communities. Given the location of the proposed multi-year survey, it could well affect endangered and sensitive species across most of the U.S. east coast, including the highly endangered right whale.

The MMPA dictates that, before permitting this action, NMFS must ensure that the project employs mitigation to obtain the least practicable impact. Unfortunately, the proposed project falls far short of this standard. Instead, it provides an analysis that consistently tends to understate impacts and fails to require available mitigation measures. Shockingly, the survey does not identify or attempt to avoid any biologically important habitat within the activity's vast survey area. Instead, NMFS relies on mitigation that the Courts have rightly described in other contexts as "woefully inadequate and ineffectual."

As a result of the near-total failure to consider site-specific data, the survey lines directly overrun several areas of established heightened biological significance. For example, the survey runs alongside Georges Bank, which is among the most diverse, productive, and trophically complex marine temperate areas in the world. In addition, the survey plans to blast through the southern portion of established mating and foraging grounds of the last North Atlantic right whales, among the most imperiled large whales on the planet; runs across a number of bio-rich canyons and seamounts off the mid-Atlantic states; crisscrosses an area of probable importance to beaked whales, one of the species identified as most sensitive to sound; and will be sounding its airguns for days through loggerhead sea turtle critical habitat. The survey needlessly harms marine mammals in direct disregard of the Marine Mammal Protection Act and recklessly impacts fish and sea turtles as well.

Given the intense controversy over seismic surveys in the Atlantic region, it is a matter of some amazement to all of our organizations that NMFS did not subject this survey application to meaningful scrutiny. We urge that NMFS deny the IHA or USGS withdraw its application, and that—at minimum—USGS revise its proposed mitigation measures in the ways discussed below, including by redrawing its survey lines to reflect well-established areas of heightened biological significance, and by providing meaningful site-specific analysis.

I. BACKGROUND: ENVIRONMENTAL IMPACTS

A large seismic airgun array can produce effective peak pressures of sound higher than those of virtually any other man-made source save explosives;[1] 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.[2] Indeed, the enormous scale of this acoustic footprint has now been confirmed by studies of seismic in numerous regions around the globe, including the Arctic, the northeast Atlantic, Greenland, and Australia.

It is well established that the high-intensity pulses produced by airguns can cause a range of impacts on marine mammals, fish, and other marine life, including broad habitat displacement, disruption of vital behaviors essential to foraging and breeding, loss of biological diversity, and, in some circumstances, injuries and mortalities.[3] Consistent with their acoustic footprint, most of these impacts are felt on an extraordinarily wide geographic scale – especially on endangered baleen whales, whose vocalizations and acoustic sensitivities overlap with the enormous low-frequency energy that airguns put in the water. For example, a single seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging – over an area at least 100,000 square nautical miles in size, and can cause baleen whales to abandon habitat over the same scale.[4]

Similarly, airgun noise can also mask the calls of vocalizing baleen whales over vast distances, substantially compromising their ability to communicate, feed, find mates, and engage in other vital behavior.[5] The intermittency of airgun pulses hardly mitigates this effect since their acoustic energy spreads over time and can sound virtually continuous at distances from the array.[6] According to recent modeling from Cornell and NOAA, the highly endangered North Atlantic right whale is particularly vulnerable to masking effects from airguns and other sources

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[1] National Research Council, *Ocean Noise and Marine Mammals* (2003).

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

[3] *See, e.g.*, Hildebrand, J.A., Impacts of anthropogenic sound, *in* Reynolds, J.E. III, Perrin, W.F., Reeves, R.R., Montgomery, S., and Ragen, T.J., eds., *Marine Mammal Research: Conservation beyond Crisis* (2006); Weilgart, L., The impacts of anthropogenic ocean noise on cetaceans and implications for management. *Canadian Journal of Zoology* 85: 1091-1116 (2007).

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

[5] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10).

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

given the acoustic and behavioral characteristics of its calls.[7] As discussed further below, the exposure levels implicated in all of these studies are lower – indeed orders of magnitude lower on a decibel scale – than the threshold used to evaluate airgun behavioral impacts in the proposed IHA. Repeated insult from airgun surveys, over months and seasons, would come on top of already urbanized levels of background noise and, cumulatively and individually, would pose a significant threat to populations of marine mammals.

Airguns are known to affect a broad range of other marine mammal species beyond the endangered great whales. For example, sperm whale foraging appears to decline significantly on exposure to even moderate levels of airgun noise, with potentially serious long-term consequences;[8] and harbor porpoises have been seen to engage in strong avoidance responses fifty miles from an array.[9] Seismic surveys have been implicated in the long-term loss of marine mammal biodiversity off the coast of Brazil.[10] Broader work on other sources of undersea noise, including noise with predominantly low-frequency components, indicates that beaked whale species would be highly sensitive to seismic noise as well.[11]

Airgun surveys also have important consequences for the health of fisheries. For example, airguns have been shown to dramatically depress catch rates of various commercial species (by 40-80%) over thousands of square kilometers around a single array,[12] leading fishermen in some parts of the world to seek industry compensation for their losses. Other impacts on commercially harvested fish include habitat abandonment – one hypothesized explanation for the fallen catch rates – reduced reproductive performance, and hearing loss.[13] Even brief playbacks of

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[7] Clark et al., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources; Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009).

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

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

[10] Parente, C.L., Pauline de Araújo, J., and Elisabeth de Araújo, M., Diversity of cetaceans as tool in monitoring environmental impacts of seismic surveys, *Biota Neotropica* 7(1) (2007).

[11] Tyack, P.L., Zimmer, W.M.X., Moretti, D., Southall, B.L., Claridge, D.E., Durban, J.W., Clark, C.W., D'Amico, A., DiMarzio, N., Jarvis, S., McCarthy, E., Morrissey, R., Ward, J., and Boyd, I.L. (2011), Beaked whales respond to simulated and actual Navy sonar, PLoS ONE 6(3): e17009. Doi:10.1371/journal.pone.0017009; Soto, N.A., Johnson, M., Madsen, P.T., Tyack, P.L., Bocconcelli, A., and Borsani, J.F. (2006), Does intense ship noise disrupt foraging in deep-diving Cuvier's beaked whales (Ziphius cavirostris)? Mar. Mamm. Sci. 22: 690-699.

[12] Engås, A., Løkkeborg, S., Ona, E., and Soldal, A.V., Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*), *Canadian Journal of Fisheries and Aquatic Sciences* 53: 2238-2249 (1996); *see also* Skalski, J.R., Pearson, W.H., and Malme, C.I., Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes ssp.*), *Canadian Journal of Fisheries and Aquatic Sciences* 49: 1357-1365 (1992).

[13] McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K., Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure on humpback whales, sea turtles, fishes, and squid (2000) (report by Curtin U. of Technology); McCauley, R., Fewtrell, J., and Popper, A.N., High intensity anthropogenic sound damages fish ears, *Journal of the Acoustical Society of America* 113: 638-642 (2003); Scholik, A.R., and Yan, H.Y., Effects of boat engine noise on

predominantly low-frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.[14] Recent data suggest that loud, low-frequency sound also disrupts chorusing in black drum fish, a behavior essential to breeding in this commercial species.[15] Several studies indicate that airgun noise can kill or decrease the viability of fish eggs and larvae.[16]

The amount of disruptive activity under consideration in this proposed IHA is substantial, especially when put into the context of cumulative impacts in the region from other activities.

II. PURPOSE AND NEED OF STUDY

The stated purpose of the study is twofold: (1) to identify the outer limits of the U.S. continental shelf, also referred to as the ECS as defined by Article 76 of the Convention of the Law of the Sea; and (2) to study the sudden mass transport of sediments down the continental shelf as submarine landslides that may pose tsunamigenic (i.e. tsunami-related) hazards. The first concerns us because of its implications for expanded oil and gas exploration in the region, and the second offers little to substantiate its immediate need.

First, the study is designed to establish the outer limits of the U.S. continental shelf, also referred to as the Extended Continental Shelf (ECS), as defined by Article 76 of the Convention of the Law of the Sea. The ECS is key in determining any entitlement of the U.S. to sovereign rights in the area beyond 200 nautical miles. One of the primary uses of such a determination is to establish mineral rights. This study coincides precisely with the Obama administration's recent release of its Environmental Impact Statement on oil and gas exploration off the East Coast, which gave the green-light to begin related seismic exploration. Within months, the Bureau of Ocean Energy Management will start issuing permits for seismic exploration, letting industry troll from New Jersey to Florida with arrays of high-powered airguns. That exploration overlaps with the southern half of this proposed study area. Any consideration of this study – and in particular the cumulative impact assessment – must include consideration of the fact that this study's underlying purpose may be to increase the area in the Mid-Atlantic that is open to oil and gas exploration and drilling and, therefore, must include an analysis of longer-term related

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the auditory sensitivity of the fathead minnow, *Pimephales promelas*, *Environmental Biology of Fishes* 63: 203-209 (2002).

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

[15] Clark, C.W., pers. comm. with M. Jasny, NRDC (Apr. 2010).

[16] Booman, C., Dalen, J., Leivestad, H., Levsen, A., van der Meeren, T., and Toklum, K., Effecter av luftkanonskyting på egg, larver og yngel (Effects from airgun shooting on eggs, larvae, and fry), *Fisken og Havet* 3:1-83 (1996) (Norwegian with English summary); Dalen, J., and Knutsen, G.M., Scaring effects on fish and harmful effects on eggs, larvae and fry by offshore seismic explorations, *in* Merklinger, H.M., *Progress in Underwater Acoustics* 93-102 (1987); Banner, A., and Hyatt, M., Effects of noise on eggs and larvae of two estuarine fishes, *Transactions of the American Fisheries Society* 1:134-36 (1973); L.P. Kostyuchenko, Effect of elastic waves generated in marine seismic prospecting on fish eggs on the Black Sea, *Hydrobiology Journal* 9:45-48 (1973).

effects on marine species and habitat of the various sources of increased disruption and harm caused by an influx of oil and gas exploration and drilling in the region.

Second, the study is designed to capture sediment thickness and geologic structure purportedly in order to study the possible risks and triggers of submarine landslides. However, in the cursory 1-page discussion of the purpose and need for the project, the Draft Environmental Assessment offers no analysis of the ability to obtain this information by modeling or alternate means, no discussion of related survey data that may be available for extrapolation, nor any prediction of the actual risk to the Eastern Seaboard of a tsunami-related submarine landslide. Without such basic information, it is impossible to ascertain the need for this study, or for any portion of the study—an essential consideration for the agency in meeting its regulatory mandate under the MMPA's mitigation provision.

III. MITIGATION & IMPACTS

The requested action has the potential for temporary or permanent hearing loss and other physical effects including stranding and death; masking and reduced effectiveness of communication; vessel strike and collision; entanglement; and stress and behavioral disturbance of marine mammals. In order to issue an Incidental Take Authorization (ITA) under section 101(a)(5)(D) of the MMPA, NMFS must set forth mitigation that ensures a means of effecting the least practicable impact. The mitigation here falls far short of that high bar on various fronts.

A. Failure to Consider Time-Area Restrictions

Time and area restrictions designed to protect high-value habitat are one of the most effective means to reduce the potential impacts of noise and disturbance, including noise from oil and gas exploration.[17] It was for this express reason that NOAA, in 2011, established a working group on Cetacean Density and Distribution Mapping, to define marine mammal hotspots for management purposes.[18] Incredibly, the proposed IHA does not consider any areas for closure, trackline avoidance, or seasonal planning for any species.[19] More specifically:

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[17] *See, e.g.*, Agardy, T., Aguilar Soto, N., Cañadas, A., Engel, M., Frantzis, A., Hatch, L., Hoyt, E., Kaschner, K., LaBrecque, E., Martin, V., Notarbartolo di Sciara, G., Pavan, G., Servidio, A., Smith, B., Wang, J., Weilgart, L., Wintle, B., and Wright, A, A global scientific workshop on spatio-temporal management of noise, Report of workshop held in Puerto Calero, Lanzarote, June 4-6, 2007 (2007); Dolman, S., Aguilar Soto, N., Notabartolo di Sciara, G., Andre, M., Evans, P., Frisch, H., Gannier, A., Gordon, J., Jasny, M., Johnson, M., Papanicolopulu, I., Panigada, S., Tyack, P., and Wright, A., Technical report on effective mitigation for active sonar and beaked whales (2009) (working group convened by European Cetacean Society); OSPAR Commission, Assessment of the environmental impact of underwater noise (2009) (report issued as part of OSPAR Biodiversity Series, London, UK); Convention on Biological Diversity, Scientific synthesis on the impacts of underwater noise on marine and coastal biodiversity and habitats (2012) (UNEP/CBD/SBSTTA/16/INF/12).

[18] Memorandum from Dr. Jane Lubchenco, Undersecretary of Commerce for Oceans and Atmosphere, to Nancy Sutley, Chair, Council on Environmental Quality at 2 (Jan. 19, 2010).

[19] Nor does the proposed IHA consider state-specific and regional efforts to identify such areas and species of heightened concern. For example, the study makes no mention of the recent work done in New York State to identify what they refer to as the Species of Greatest Conservation need (SGCN). This effort was conducted by the

1. Time-area restrictions for marine mammals

The study area includes important marine mammal habitat that was not considered for time-area restrictions.[20]

(a.) Georges Bank

Georges Bank is a region rich with marine life, ranging from plankton to marine mammals and is well-recognized as among the most diverse, productive, and trophically complex marine temperate areas in the world.[21] As a result of this abundant food, the edge of Georges Bank is a foraging area for many cetaceans including right whales,[22] humpback whales,[23] sei whales,[24] beaked whales, fin whales,[25]sperm whales,[26] pilot whales, spotted dolphins, striped dolphins, offshore bottlenose dolphins, Risso's dolphins, and common dolphins.[27] There are high densities of foraging cetaceans during all parts of the year, but the summer months (June through October) have the highest densities.[28] Indeed, due to the high densities and diversity of marine mammals, Georges Bank is a popular whale watching location during the summer and early fall.

In addition to cetaceans, Georges Bank contains a high concentration of Illex and Loligo squid, which support important commercial fisheries in this area and are an important food source for mammals and for commercially important species such as tuna and swordfish. Illex are present in this area in largest numbers in the summer months, May through September.

New York Department of Environmental Conservation, Bureau of Marine Resources staff in consultation with regional experts, and it culminated in the compilation and mapping of a list of, e.g., marine deep subtidal SGCN. These species and this effort should have been considered in planning the regional study.

[20] We also would note that while we appreciate the inclusion in the Draft Environmental Assessment of the species-specific distribution and habitat use, these maps do not account for or correct for survey effort over the region. Often, survey effort tends to be concentrated along the shore, and so, the animal occurrence maps run the real risk of over-emphasizing the importance of these waters relative to the deeper waters that make up most of the study area.

[21] Link, J., Overholtz, W., O'Reilly, J., Green, J., Dow, D., Palka, D., et al. (2008). The Northeast U.S. continental shelf Energy Modeling and Analysis exercise (EMAX): Ecological network model development and basic ecosystem metrics. Journal of Marine Systems, 74(1-2), 453-474.

[22] http://www.dfo-mpo.gc.ca/Library/344232.pdf (Table 2-3 (p. 156)). P. 160 says fin whales are there year round. P. 161 says sei whales are found there spring and summer. P. 164 says humpbacks can be seen there in summer. P. 166 discusses sperm whales being there

[23] *See* http://www.nature.com/news/2003/030804/full/news030804-1.html.

[24] *Id.* at p. 161.

[25] *Id.* at p. 160.

[26] *Id.* at pp. 156, 166.

[27] Hamazaki, T. (2002). Spatiotemporal prediction models of cetacean habitats in the mid-western North Atlantic ocean(from Cape Hatteras, North Carolina, U. S. A. to Nova Scotia, Canada). Marine Mammal Science, 18(4), 920-939; Palka, D. (2006). Summer abundance estimates of cetaceans in US North Atlantic navy operating areas. US Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc, 06-03; Selzer, L., & Payne, P. (1988). The distribution of white-sided dolphins (Lagenorhynchus acutus) and common dolphins (Delphinus delphis) vs. environmental features of the continental shelf of the northeastern United States. Mar. Mammal Sci, 4, 141-153.

[28] Winn, H. (1982). A characterization of marine mammals and turtles in the Mid-and North Atlantic areas of the US outer continental shelf. Final report. Sponsored by the Bureau of Land Management under contract AA551-CT8-48. 450pp.

On the southern edge of Georges Bank, three undersea canyons – Oceanographer, Gilbert, and Lydonia Canyon – cut into the continental shelf. The three canyons range in depth from approximately 500 feet to 7,700 feet and in length from 22 to 30 miles. However, the full extension of the canyons includes their channels and fan valleys and can be more than twice as long.[29] The canyons support a uniquely diverse set of species (326 species have been identified in the canyons),[30] and the depth, ruggedness, and isolation of the canyons has kept them relatively protected from human impacts while also rendering them extremely vulnerable to disturbance. Endangered sperm whales come to the canyons to forage on squid.[31] Other deep-diving marine mammals, like endangered and highly-depleted North Atlantic right whales, beaked whales, pilot whales and various species of dolphins, have also been observed along the shelf break in the Atlantic Ocean, and it is very likely that they use canyon and seamount productive zones as foraging or migration stops.[32] For example, marks on the seafloor at sites off of Gilbert and Lydonia canyons were inferred to be beaked whale foraging tracks.[33] These distinctive and pristine marine gems require special attention and protection.

Because of the incredibly rich diversity of species that congregate around Georges Bank throughout the year and, most heavily, during the summer months, the survey should be prohibited from entering Georges Bank or the slope waters off Georges Bank, and the survey track lines should be designed to ensure a buffer zone minimally sufficient to minimize potential behavioral impacts on naïve deep-diving whales and disruption of communication with baleen whales.

To the extent that survey lines cut across the three identified canyons – Oceanographer, Gilbert, and Lydonia – the agency should redraw them to avoid overrunning these important foraging waters and to ensure a sufficient buffer between the track line and the canyon.

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[29] Pratt RM. 1967. The seaward extension of submarine canyons off the northeast coast of the United States. Deep Sea Research 14:409-420.

[30] Hecker B, Blechschmidt G, Gibson P. 1980. Epifaunal Zonation and Community Structure in Three Mid- and North Atlantic Canyons. In: Final Report: Canyon Assessment Study in the Mid- and North Atlantic Areas of the US Outer Continental Shelf. Prepared for the U.S. Department of the Interior; Kelly NE, Shea EK, Metaxas A, Haedrich RL, Auster PJ. 2010. Biodiversity of the Deep-Sea Continental Margin Bordering the Gulf of Maine (NW Atlantic): Relationships among Sub-Regions and to Shelf Systems. PLoS ONE 5(11): e13832.

Moore JA, Hartel KE, Galbraith JK, Turnipseed M, Southworth M, Watkins E. 2003. Biodiversity of Bear Seamount, New England Seamount Chain: Results of exploratory trawling. Journal of Northwest Atlantic Fishery Science 31: 363-372.

[31] Hendrickson LC. 2004. Population biology of the northern shortfin squid (Illex illecebrosus) in the Northwest Atlantic Ocean and initial documentation of a spawning area. ICES Journal of Marine Science 61: 252-266; Sperm Whales (Physeter macrocephalus) Species Profile, NOAA Fisheries Office of Protected Resources. Available at http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm.

[32] Kaschner, K. 2007. Air-breathing visitors to seamounts: Marine Mammals. Chapter 12 Section A. Pp 230-238 in Pitcher T.J., Morato T., Hart P.J.B., Clark M.R., Haggan N. and Santos R.S. (eds) Seamounts: Ecology, Conservation and Management. Fish and Aquatic Resources Series, Blackwell, Oxford, UK; North Atlantic Right Whales (Eubalaena glacialis) Species Profile, NOAA Fisheries Office of Protected Resources. Available at http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale_northatlantic.htm.

[33] Auster PJ, Watling L. 2009. Beaked whale foraging areas inferred by gouges in the seafloor. Marine Mammal Science 26(1): 226-233.

(b.) Mid-Atlantic submarine canyons

As discussed above, submarine canyons support high concentrations and a great diversity of marine wildlife. Physically, they are complex, with outcrops, steep slopes, and different classes of substrates. They also provide a high flux of fine-particle nutrients and often encompass areas of upwelling, which are associated with high biological productivity.

In the mid-Atlantic there are several major submarine canyons, including Norfolk, Washington, Baltimore, Wilmington, Hudson, and Veatch. It is difficult to determine from USGS's application when one of its survey track lines crosses a canyon, but it does appear that the 2014-9 (Phase 1) survey line cuts through Hudson Canyon.

Because of its established importance of this habitat as a biologically rich foraging ground for numerous species of marine mammals and other marine life, the survey line should be redrawn to avoid Hudson Canyon. **To the extent that other survey lines cut across these additional identified canyons, the agency should redraw them to avoid overrunning these important foraging waters and to ensure a sufficient buffer between the track line and the canyon.**

(c.) Seamounts

Seamounts are rare oases of life in the cold darkness of the deep sea, fostering a remarkable diversity and concentration of marine life. Strong currents and circulation patterns around the seamounts create turbulent waters that enhance mixing of surface and deep water, transport nutrients, and concentrate food supply.[34] The increased production in and around these features echoes up throughout the water column and food chain to create biodiversity "hotspots" in the open ocean.[35]

Bear, Physalia, Mytilus, and Retriever seamounts are underwater mountains that rise as high as 12,000 feet above the ocean floor. At almost 20 miles across, Bear Seamount is the largest of the four, and it rises to the shallowest depth, approximately 3500 feet below the surface. These "biological islands" in the deep sea are ideal incubators for new life, due in large part to their unique topography and current patterns.[36] Currents around these features intensify and form eddies, trapping larvae and other small organisms in a closed loop over each seamount.[37] The substrate on the seamounts varies widely, and – due to the variety of bottom types – many different species can be found living in close proximity to each other, leading scientists to refer

[34] Worm B, Lotze HK, Myers RA. 2003. Predator diversity hotspots in the blue ocean. PNAS 100(17): 9884-9888.
[35] Morato T, Hoyle SD, Allain V, Nicol SJ. 2010. Seamounts are hotspots of pelagic biodiversity in the open ocean. PNAS 107(21): 9707–9711.
[36] Moore JA, Hartel KE, Galbraith JK, Turnipseed M, Southworth M, Watkins E. 2003. Biodiversity of Bear Seamount, New England Seamount Chain: Results of exploratory trawling. Journal of Northwest Atlantic Fishery Science 31: 363-372.
[37] Mills S. 2003. Seamount Coral Communities. NOAA Ocean Explorer Mountains in the Sea. Available at http://oceanexplorer.noaa.gov/explorations/03mountains/background/larvae/larvae.html.

to the seamounts as ocean oases.[38] Six hundred and thirty species have been identified on these seamounts.[39]

Recent studies suggest that this seamount chain – i.e. Bear, Physalia, Mytilus, and Retriever – may act as a dispersal corridor, helping species to cross the Atlantic.[40] This has implications for species resilience, providing a potential mechanism for long-distance dispersal and thus adaptability in the face of changing environmental conditions. It also highlights the interconnectedness of these underwater habitats, underscoring the importance of protecting all four seamounts.

The survey lines currently run across or approach the Bear, Physalia, Mytilus, and Retriever seamounts. **The survey lines should be modified and redesigned to avoid the four seamounts in order to ensure the least practicable impact on marine mammals and should include a buffer zone to minimize marine mammal take.**

(d.) North Atlantic right whale habitat

The cetacean of greatest concern in the region is the North Atlantic right whale, a species that has a minimum population of only about 450 whales and is considered one of the most imperiled large whales on the planet. **In order to protect this species and comply with its obligations under the Endangered Species Act, NMFS must exclude all of the North Atlantic right whale's year-round feeding and mating habitat areas from seismic and vessel activities.** These areas include both designated critical habitat as well as areas that have not yet been designated as critical habitat but are known to be important habitat. As NMFS has repeatedly stated, "the loss of even a single individual [North Atlantic right whale] may contribute to the extinction of the species" and "preventing the mortality of one adult female a year" may alter this outcome.[41]

We would also note, and USGS and NMFS need to account for the fact that right whales are found throughout the region and their movements are not so neatly confined to seasonal and life-cycle-related areas in the way the Draft Environmental Assessment suggests. This need is increased because real-time visual monitoring is very difficult for right whales, especially during

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[38] Moore JA. 2003. Biodiversity on the New England Seamounts. NOAA Ocean Explorer Mountains in the Sea Logs. Available at http://oceanexplorer.noaa.gov/explorations/03mountains/logs/summary/summary.html.
[39] Kelly NE, Shea EK, Metaxas A, Haedrich RL, Auster PJ. 2010. Biodiversity of the Deep-Sea Continental Margin Bordering the Gulf of Maine (NW Atlantic): Relationships among Sub-Regions and to Shelf Systems. PLoS ONE 5(11): e13832.
[40] Moore JA, Vecchione M, Collette BB, Gibbons R, Hartel KE. 2004. Selected fauna of Bear Seamount (New England Seamount chain), and the presence of "natural invader' species. Arch. Fish. Mar. Res. 51 (1-3): 241-250; Moore JA, Auster PJ, Calini D, Heinonen K, Barber K, Hecker B. 2008. False Boarfish Neocyttus helgae in the Western North Atlantic. Bulletin of the Peabody Museum of Natural History 49(1).
[41] *See* 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. 60,173, 60,173 (Oct. 10, 2008); 72 Fed. Reg. 34,632, 34,632 (June 25, 2007); 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001).

high sea states, nighttime operations, and other low-visibility conditions, and is further complicated by the size of the impact zone that the monitoring effort would have to cover.[42]

(e.) Other areas identifiable through habitat mapping

NMFS has not attempted any systematic analysis of marine mammal habitat for purposes of establishing time-area closures within the study area.

i. Predictive mapping — Over the past few years, researchers have developed at least two predictive models to characterize densities of marine mammals in the area of interest: the NODE model produced by the Naval Facilities Engineering Command Atlantic, and the Duke Marine Lab model produced under contract with the Strategic Environmental Research and Development Program. Until Duke has produced its new cetacean density model, pursuant to NOAA's CetMap program, NMFS should use these sources, which represent best available science to identify important marine mammal habitat and ensure the least practicable impact. Species of particular importance, aside from the North Atlantic right whale, include the five other large whale species listed under the Endangered Species Act, *i.e.*, blue, fin, sei, humpback, and sperm whales; and beaked whales and harbor porpoises, whose vulnerability to anthropogenic noise is well recognized.

ii. Persistent oceanographic features — Marine mammal densities are correlated over medium to large scales with persistent ocean features, such as currents, productivity, and surface temperature, as well as with concentrations in other marine species, such as other apex predators and fish.[43] The occurrence of these features is often predictable enough to define core areas of biological importance on a year-round or seasonal basis.[44] Analysis of these features should figure in predictive mapping, but can be used to supplement maps that do not take dynamic features into account.

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[42] *E.g.*, Barlow, J., and Gisiner, R., Mitigation and monitoring of beaked whales during acoustic events, *Journal of Cetacean Research and Management* 7: 239-249 (2006); 72 Fed. Reg. 46846, 46875 (Aug. 21, 2007) (SURTASS LFA rulemaking); Dolman, S., Aguilar de Soto, N., Notabartolo di Sciara, G., Andre, M., Evans, P., Frisch, H., Gannier, A., Gordon, J., Jasny, M., Johnson, M., Papanicolopulu, I., Panigada, S., Tyack, P., and Wright, A., Technical report on effective mitigation for active sonar and beaked whales (2009) (report from European Cetacean Society); Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009).

[43] Hyrenbach, K.D., Forney, K.A., and Dayton, P.K. (2000), Marine protected areas and ocean basin management, *Aquatic Conservation: Marine and Freshwater Ecosystems* 10:437-458.

[44] *Id.* ("Design Recommendations for Pelagic MPAs" include the use of persistent oceanographic features like sea temperature to define core areas for protection).

2. Time-area restrictions for sea turtles and fish

The proposed study area overlaps with populations of sea turtles, including green, leatherback, loggerhead, hawksbill, and Kemp's Ridley. The recovery plan for the Northwest Atlantic population of loggerhead sea turtles notes that seismic surveying, among other activities, threaten these populations.[45] And recent analysis of sea turtle hearing confirms that loggerheads and other sea turtles have their greatest acoustic sensitivity below 400 Hz, where much of the energy produced by airguns is concentrated.[46] Given these findings, as well as the global significance of the region for loggerheads, all important habitats for endangered and threatened sea turtles in the area of interest should be avoided. In particular, important foraging and migrating habitat should receive consideration for time-area closure and all critical habitat should be avoided.

For example, the survey area currently cuts through large swaths of recently designated loggerhead *Sargassum* critical habitat.[47] *Sargassum* is a genus of seaweed that lives on the surface water of the open ocean, forming large floating mats. These mats provide essential forage, cover, and transport habitat for post-hatchlings and early juvenile loggerhead sea turtles.[48] Satellite imagery data – referenced in NMFS' own loggerhead critical habitat designation – found *Sargassum* in a widespread area of the Atlantic Ocean from Cape Hatteras and waters there north, and found that the *Sargassum*'s presence was particularly concentrated in the summer months.[49] As NMFS explained in support of its critical habitat designation, the science shows that *Sargassum* production varies by season, and in the Atlantic, has the greatest biomass occurring off the coast after July.[50] The physical forces that aggregate *Sargassum* also aggregate pollutants and debris, making this habitat especially vulnerable.[51]

Important turtle foraging and migrating habitat should receive consideration for time-area closure, and all loggerhead sea turtle critical habitat should be avoided during the summer months when *Sargassum* is present.

Similarly, the proposed IHA should consider excluding important fish habitat areas, including waters above the soft bottom Northeast U.S. Continental Shelf Large Marine Ecosystem (LME), which is considered essential fish habitat (EFH).

B. Failure to Adequately Consider Reasonable Mitigation and Monitoring Measures

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[45] *Id.*

[46] Piniak, W.E.D., Mann, D.A., Eckert, S.A., and Harms, C.A., Amphibious hearing in sea turtles, *in* Popper, A.N., and Hawkins, A., eds., *The Effects of Noise on Aquatic Life* at 83-88 (2012).

[47] *See* http://www.nmfs.noaa.gov/pr/species/turtles/images/loggerhead_critical_habitat_map.jpg.

[48] 79 FR 39883.

[49] 79 FR 39882.

[50] 79 FR 39882.

[51] *Id.*

The proposed IHA does not adequately consider, or fails to consider at all, a number of other reasonable measures that could significantly reduce take from the proposed activities. These measures include, but are not limited to:

1. **Survey design standards and review**

NMFS should require that the airgun survey vessel use the lowest practicable source level, minimize horizontal propagation of the sound signal, and minimize the density of track lines consistent with the purposes of the survey.[52] While cursory consideration is given to the source level, little explanation of the conclusion that a 36 airgun array is required is offered. We would note that, in the past, the California Coastal Commission has required the U.S. Geological Survey to reduce the size of its array for seismic hazards work, and to use alternative seismic technologies to reduce acoustic intensities during earthquake hazard surveys to their lowest practicable level.[53]

2. **Multi-beam echosounder**

NMFS should also require use of an alternative multi-beam echosounder to the one presently proposed. An industrial multibeam echosounder employed by Exxon occurred in close spatial and temporal association with a mass stranding of melon-headed whales off Madagascar, in 2008; a similar ;[54] a comparable multibeam sonar system—with a center frequency of 15.5 kHz and associated source levels of 237 dB—was used by a Lamont-Doherty Earth Observatory research survey prior to the Gulf of California beaked whale strandings in September 2002, with which the survey was closely correlated, and may have played a role in that event as well.[55] Regardless of the potential for strandings in the present case, it is clear that high-power, lower-frequency echosounders have the potential to impact marine mammal behavior, especially of

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[52] Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009); Burns, J., Clark, C., Ferguson, M., Moore, S., Ragen, T., Southall, B., and Suydam, R., Expert panel review of monitoring and mitigation protocols in applications for incidental harassment authorizations related to oil and gas exploration, including seismic surveys, in the Chukchi and Beaufort Seas (2010) (NMFS Expert Panel Review 2010); Brower, H., Clark, C.W., Ferguson, M., Gedamke, J., Southall, B., and Suydam, R., Expert panel review of monitoring protocols in applications for incidental harassment authorizations related to oil and gas exploration in the Chukchi and Beaufort Seas, 2011: Statoil and ION Geophysical (2011) (NMFS Expert Panel Review 2011).

[53] *See*, *e.g.*, California Coastal Commission, Staff Recommendation on Consistency Determination No. CD-16-00 (2000) (review of USGS survey off southern California).

[54] Southall, B.L., Rowles, T., Gulland, F., Baird, R. W., and Jepson, P.D. 2013. Final report of the Independent Scientific ReviewPanel investigating potential contributing factors to a 2008 mass stranding of melon-headed whales (*Peponocephala electra*) in Antsohihy, Madagascar.

[55] Cox, T.M., Ragen, T.J., Read, A.J., Vos, E., Baird, R.W., Balcomb, K., Barlow, J., Caldwell, J., Cranford, T., Crum, L., D'Amico, A., D'Spain, G., Fernández, A., Finneran, J., Gentry, R., Gerth, W., Gulland, F., Hildebrand, J., Houser, D., Hullar, T., Jepson, P.D., Ketten, D., MacLeod, C.D., Miller, P., Moore, S., Mountain, D., Palka, D., Ponganis, P., Rommel, S., Rowles, T., Taylor, B., Tyack, P., Wartzok, D., Gisiner, R., Mead, J., and Benner, L., Understanding the impacts of anthropogenic sound on beaked whales. 7 *J. Cetacean Res. Manage.* 177-187 (2006); Hildebrand, J., Impacts of anthropogenic sound, *in* Ragen, T.J., Reynolds III, J.E., Perrin, W.F., Reeves, R.R., and Montgomery, S. (eds.), *Marine Mammal Research: Conservation beyond Crisis* 101-123 (2006).

odontocetes, over a wide spatial scale—and to a far greater extent than has previously been supposed for this category of sound source.[56] Given the acoustic characteristics of the Langseth's echosounder, use of an alternative for part or all of the survey must be considered.

3. Sound source validation

Relatedly, NMFS should require USGS to validate the assumptions about propagation distances used to establish safety zones and calculate take (*i.e.*, at minimum, the 160 dB and 180 dB isopleths). Sound source validation has been required of Arctic operators for several years, as part of their IHA compliance requirements, and has proven useful for establishing more accurate, *in situ* measurements of safety zones and for acquiring information on noise propagation.[57]

4. Adequate safety zone distances

NMFS should reconsider the size of the safety zone. The proposed IHA proposes establishing a safety zone of 180 dB re 1 µPa (with a 500 m minimum) around the seismic array. Gedamke et al. (2011), whose lead author is the present director of NMFS' Bioacoustics Program, has put traditional means of estimating safety zones into doubt. That paper demonstrates through modeling that, when uncertainties about impact thresholds and intraspecific variation are accounted for, a significant number of whales could suffer temporary threshold shift (*i.e.*, hearing loss) beyond 1 km from a relatively small seismic array (source energy level of 220 dB re 1 $\mu Pa^2(s)$) – a distance that seems likely to exceed NMFS's estimates.[58] Moreover, a recent dose-response experiment indicates that harbor porpoises are substantially more susceptible to temporary threshold shift than the two species, bottlenose dolphins and belugas, that had previously been tested.[59] And a number of recent studies suggest that the relationship between temporary and permanent threshold shift may not be as predictable as previously believed.[60]

Finally, NMFS should consider establishing larger shutdown zones for certain target species. Although time/area closures are a more effective means of reducing cumulative exposures of wildlife to disruptive and harmful sound, these expanded safety zones have value in minimizing disruptions, and potentially in reducing the risk of hearing loss and injury, outside the seasonal

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[56] The point is echoed by Southall et al., Final Report of the Independent Scientific Review Panel.

[57] *See*, *e.g.*, Burns et al., Expert Panel Review (2010), *supra*; Brower et al., Expert Panel Review (2011), *supra*.

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

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

[60] Kastak, D., Mulsow, J., Ghoul, A., Reichmuth, C., Noise-induced permanent threshold shift in a harbor seal [abstract], *Journal of the Acoustical Society of America* 123: 2986 (2008) (sudden, non-linear induction of permanent threshold shift in harbor seal during TTS experiment); Kujawa, S.G., and Liberman, M.C., Adding insult to injury: Cochlear nerve degeneration after "temporary" noise-induced hearing loss, *Journal of Neuroscience* 29: 14077-14085 (2009) (mechanism linking temporary to permanent threshold shift).

closure areas.[61] Visual sighting of any individual right whale at any distance should trigger shut-down; for other species, shut-down should occur if aggregations are observed within the 160 dB isopleth around the sound source.

5. Adequate real-time monitoring

It is well established that real-time visual shipboard monitoring is difficult for all marine mammal and sea turtle species, especially at night and during high sea states and fog.[62] Supplemental methods that have been used on certain other projects include hydrophone buoys and other platforms for acoustic monitoring, aerial surveys, shore-based monitoring, and the use of additional small vessels. Here, the real-time monitoring effort proposed in the IHA is inadequate.

While NMFS seems to require two observers for the airgun survey during the majority of the time (it notes that there will be only one observer during meal times and bathroom breaks) – the minimum number necessary to maintain 360-degree coverage around the seismic vessel –it otherwise sets forth requirements that are inconsistent with survey conventions and with prior studies of observer effectiveness. *First*, NMFS would allow visual and acoustic observers to work at four-hour stretches. That four-hour work cycle doubles the amount of time conventionally allowed for marine mammal observation aboard NMFS survey vessels, and is even less appropriate for conditions where, as here, an animal's health is at stake. *Second*, NMFS offers no details about the training requirements of its vessel-based observers. Yet, as UK data have demonstrated, use of observers with no meaningful experience in marine mammal observation, such as ships' crew, results in extremely low levels (approaching zero percent) of detection and compliance.[63] NMFS should require field experience in marine mammal observation of any observer.

Furthermore, the study only requires passive acoustic monitoring ("PAM") as practicable with no further guidance on when monitoring is or isn't practicable. There is no reason why PAM should not be mandated. Furthermore, with only one expert bioacoustician on board, the proposed IHA suggests that he or she would "ideally" monitor the PAM system 24 hours per day. This is wholly unrealistic, and it fails to account for the study design which runs non-stop for weeks on end. No consideration is made of the heightened need for PAM during low visibility or night-time hours.

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[61] *See* MMS, Final Programmatic Environmental Assessment, Arctic Outer Continental Shelf Seismic Surveys – 2006, OCS EIS/EA MMS 2006-038 at 110-111 (June 2006) (noting sensitivity of baleen whale cow-calf pairs).

[62] *See, e.g.*, Barlow, J., and Gisiner, R., Mitigation and monitoring of beaked whales during acoustic events, *J. Cetacean Res. Manage.* 7: 239-249 (2006); Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009).

[63] Stone, C.J., The effects of seismic surveys on marine mammals in UK waters: 1998-2000 (2003) (Joint Nature Conservation Committee Report 323); *see also* Parsons et al., A critique of the UK's JNCC seismic survey guidelines, *supra*. It is worth noting that the "inexperienced" marine mammal observers involved in the UK study usually still received some basic training. Stone, The effects of seismic surveys, *supra*.

Indeed, the proposed IHA makes no consideration of limiting activities in low-visibility conditions or at night, which can reduce the risk of ship-strikes and near-field noise exposures.

6. Technology-based mitigation

New technology represents a promising means of reducing the environmental footprint of seismic exploration. Industry experts and biologists participating in a September 2009 workshop on airgun alternatives reached the following conclusions: that airguns produce a great deal of "waste" sound and generate peak levels substantially higher than needed for offshore exploration; that a number of quieter technologies are either available now for commercial use or can be made available within the next five years; and that governments should accelerate development and use of these technologies through both research and development funding and regulatory engagement.[64]

Among the technologies discussed in the 2009 workshop report are engineering modifications to airguns, which can cut emissions at frequencies not needed for exploration; controlled sources, such as marine vibroseis, which can dramatically lower the peak sound currently generated by airguns by spreading it over time; various non-acoustic sources, such as electromagnetic and passive seismic devices, which in certain contexts can eliminate the need for sound entirely; and fiber-optic receivers, which can reduce the need for intense sound at the source by improving acquisition at the receiver.[65] An industry-sponsored report by Noise Control Engineering made similar findings about the availability of greener alternatives to seismic airguns, as well as alternatives to a variety of other noise sources used in oil and gas exploration.[66] Considerable current effort is focused on developing quieting technologies for use in offshore exploration. Last winter, BOEM convened an international workshop on noise-reduction alternatives for deep-penetration seismic exploration, pile-driving for offshore construction, and shipping for offshore development in general. Findings of that workshop, which were released in a BOEM report, emphasize the promise of vibroseis.[67] Last June, parties to *NRDC v. Jewell* entered into a settlement agreement that establishes a timeframe for industry development and testing of three vibroseis prototypes;[68] and Geo-Kinetics has made substantial recent progress in bringing its own vibroseis unit to commercial viability, with an array potentially becoming available later this year. In 2012, BP North America patented a different noise-reduction

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

[65] *Id.*

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

[67] CSA Ocean Sciences, Quieting Technologies for Reducing Noise During Seismic Surveying and Pile Driving Workshop. Summary Report for the US Dept. of the Interior (2014) (BOEM rep. no. 2014-061).

[68] Settlement Agreement, NRDC v. Jewell, Case No. 2: 10-cv-01882 (E.D. La.) (settlement filed June 18, 2013).

method—one that uses software to stagger bursts of airgun fire, in order to reduce the effective source level of the array.[69]

The proposed IHA, however, fails to include any requirement to use or test the use of new technologies in the USGS Atlantic survey.

IV. IMPACTS ANALYSIS

A. Failure to Set Proper Thresholds for Marine Mammal Take

In addition to not implementing measures that would reduce take, NMFS has underestimated marine mammal take from the proposed study. The reasons for this are manifold, but lie principally in the agency's mistaken adoption of a 160 dB threshold for Level B take and its failure to adequately calculate impacts from masking. Nor has NMFS performed a sensitivity analysis to determine how significantly its take and impact estimates would differ if some of its core assumptions – such as its 160 dB threshold – are wrong.

1. Illegal threshold for behavioral take

NMFS uses a single sound pressure level (160 dB re 1 µPa (RMS)) as a threshold for behavioral, sublethal take in all marine mammal species from seismic airguns. This approach simply 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 have characterized the present threshold, in a comment letter to NMFS, as "overly simplified, scientifically outdated, and artificially rigid."[70] *See* 40 C.F.R. § 1502.22. NMFS must use a more conservative threshold for the following reasons:

The agency's use of a single, non-conservative, bright-line threshold for all species flies in the face of recent science and is untenable. In particular, 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 100,000 square nautical miles in size, and can cause baleen whales to abandon habitat over the same scale.[71] Similarly, a low-frequency, high-amplitude fish mapping device was found to

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[69] A. Ross and R.L. Abma, Offshore prospecting signal processing controlled source signaling, U.S. Patent 20,120,147,701 (June 14, 2012) (*available at*: http://www.faqs.org/patents/app/ 20120147701).

[70] Clark, C., Mann, D., Miller, P., Nowacek, D., and Southall, B., Comments on Arctic Ocean Draft Environmental Impact Statement at 2 (Feb. 28, 2012).

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

silence humpback whales at distance of 200 km, where received levels ranged from 88 to 110 dB; and several other studies clearly indicate disruption of biologically significant behaviors in baleen whales are drastically lower received levels than considered here.[72] Sperm whale foraging success, as measured by buzz rate, appears to decline significantly on exposure to airgun received levels above 130 dB (RMS), with potentially serious long-term consequences.[73] Harbor porpoises are known to be acutely sensitive to a range of anthropogenic sources, including airguns. They have been observed to engage in avoidance responses fifty miles from a seismic airgun array – a result that is consistent with both captive and wild animal studies showing them abandoning habitat in response to pulsed sounds at very low received levels, well below 120 decibels (re 1 µPa (RMS)).[74] Beaked whales, though never tested experimentally for their response to airgun noise, have shown themselves to be sensitive to various types of anthropogenic sound, going silent, abandoning their foraging, and avoiding sounds at levels of 140 dB and potentially well below.[75]

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;[76] since that time, the literature on ocean noise has expanded enormously due to massive increases in research funding from the U.S. Navy, the oil and gas industry, and other sources. The evidentiary record for a lower threshold in this case substantially exceeds the one for mid-frequency sonar in *Ocean Mammal Institute v. Gates*, 546 F. Supp.2d 960, 973-75 (D.Hawaii 2008), in which a Hawaiian

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[72] See, e.g., Risch, D., Corkeron, P.J., Ellison, W.T., and van Parijs, S.M., Changes in humpback whale song occurrence in response to an acoustic source 200 km away, PLoS ONE 7(1): e29741. doi:10.1371/journal.pone.0029741 (2012); Cerchio, S., Strindberg, S., Collins, T., Bennett, C., and Rosenbaum, H., Seismic surveys negatively affect humpback whale singing activity off Northern Angola, *PLoS ONE* 9(3): e86464. doi:10.1371/journal.pone.0086464 (2014); Castellote, M., Clark, C.W., and Lammers, M.O., Acoustic and behavioural changes by fin whales (*Balaenoptera physalus*) in response to shipping and airgun noise, *Biological Conservation* 147: 115-122 (2012).

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

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

[75] Soto, N.A., Johnson, M., Madsen, P.T., Tyack, P.L., Bocconcelli, A., and Borsani, J.F., Does intense ship noise disrupt foraging in deep-diving Cuvier's beaked whales (*Ziphius cavirostris*)? *Mar. Mamm. Sci.* 22: 690-699 (2006); Tyack, P.L., Zimmer, W.M.X., Moretti, D., Southall, B.L., Claridge, D.E., Durban, J.W., Clark, C.W., D'Amico, A., DiMarzio, N., Jarvis, S., McCarthy, E., Morrissey, R., Ward, J., and Boyd, I.L., Beaked whales respond to simulated and actual Navy sonar, *PLoS ONE* 6(3):e17009.doi:10.13371/journal.pone.0017009 (2011) (beaked whales); California State Lands Commission, Draft Environmental Impact Report (EIR) for the Central Coastal California Seismic Imaging Project at H-47 (2012) (CSLC EIR No. 758).

[76] High Energy Seismic Survey Team, High energy seismic survey review process and interim operational guidelines for marine surveys offshore Southern California (1999).

District Court judge invalidated a NMFS threshold that ignored documented impacts at lower received levels as arbitrary and capricious.

In addition, using a single sound pressure level of 160-dB for harassment represents a major step backward from recent authorizations. For Navy sonar activity, NMFS has incorporated into its analysis linear risk functions that endeavor to account for risk and individual variability and to reflect the potential for take at relatively low levels. Using a single sound pressure level of 160-dB for harassment represents a major step backward from recent authorizations. For Navy sonar activity, NMFS has incorporated into its analysis linear risk functions that endeavor to account for risk and individual variability and to reflect the potential for take at relatively low levels.[77]

The use of a multi-pulse standard for behavior harassment is non-conservative, since it does not take into account the spreading of seismic pulses over time beyond a certain distance from the array.[78] NMFS' own Open Water Panel for the Arctic – which has included some of the country's leading marine bioacousticians – has twice characterized the seismic airgun array as a mixed impulsive/continuous noise source and has stated that NMFS should evaluate its impacts on that basis.[79] That analysis is supported by the masking effects model referenced above, in which several NMFS scientists have participated; 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;[80] and, we expect, by the modeling efforts of NOAA's Sound Mapping working group, whose public release is supposed to occur in early July. NMFS should not ignore this science.

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 because of the degree to which pulsed sounds must be "stretched," resulting in significant potential underestimates of marine mammal take.[81]

Finally, NMFS must consider that even behavioral disturbance can amount to Level A take if it interferes with essential life functions through secondary effects. For example, displacement

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[77] *See, e.g.*, 74 Fed. Reg. 4844, 4844-4885 (Jan. 27, 2009).

[78] *See* Expert Panel Review 2011.

[79] *Id.*; *see also* Expert Panel Review 2010.

[80] 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., Klinck, H., Klinck, K., Mellinger, D.K., and Dziak, R.P., 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., Mellinger, D.K., Moore, S.E., Klinck, K., Dziak, R.P., Goslin, J., Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999-2009, *Journal of the Acoustical Society of America* 131:1102- 1112 (2012); Nieukirk, S.L., Stafford, K.M., Mellinger, D.K., Dziak, R.P., and Fox, C.G., Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic Ocean, *Journal of the Acoustical Society of America* 115: 1832-1843 (2004); Roth, E.H., Hildebrand, J.A., Wiggins, S.M., and Ross, D., Underwater ambient noise on the Chukchi Sea continental slope, *Journal of the Acoustical Society of America* 131:104-110 (2012).

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

from migration paths can result in heightened risk of ship strike or predation; and some sound sources can cause. beaked whales to change their behavior, resulting in pathologies consistent with decompression sickness. NMFS must take into account the best available science and set lower thresholds for Level A take, which, as noted above, would lead to larger exclusion zones around the survey.

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

i. NMFS should employ a combination of specific thresholds for which sufficient species-specific data are available and generalized thresholds for all other species.[82] These thresholds should be expressed as linear risk functions where appropriate. If a single risk function is used for most species, the 50% take parameter for all the baleen whales and odontocetes occurring in the area should not exceed 140 dB (RMS), per the February 2012 recommendation from Dr. Clark and his colleagues. At least for sensitive species such as harbor porpoises and beaked whales, NMFS should use a threshold well below that number, reflecting the high levels of disturbance seen in these species at 120 dB (RMS) and below. Recent analysis by the California State Lands Commission provides another alternative, differentiating among low-frequency, mid-frequency, and high-frequency cetaceans in a manner that is generally consistent with Southall et al (2007).[83]

ii. Data on species for which specific thresholds are developed should be included in deriving generalized thresholds for species for which less data are available.

iii. In deriving its take thresholds, NMFS should treat airgun arrays as a mixed acoustic type, behaving as a multi-pulse source closer to the array and, in effect, as a continuous noise source further from the array, per the findings of the 2011 Open Water Panel cited above.

iv. Behavioral take thresholds for the impulsive component of airgun noise should be based on peak pressure rather than on RMS, or dual criteria based on both peak pressure and RMS should be used. Alternatively, NMFS should use the most biologically conservative method of calculating RMS, following Madsen (2005). (See section IV.C. below for additional detail.)

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[82] By "thresholds," we mean either bright-line thresholds or linear risk functions.

[83] California State Lands Commission, Draft Environmental Impact Report at Chap. 4.4 and App. H, *supra*; *see also* Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran. J.J., Gentry, R.L., Greene, C.R., Jr., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack, P.L., Marine mammal noise exposure criteria: Initial scientific recommendations, *Aquatic Mammals* 33:411-521 (2007).

2. Erroneous "small numbers" and "negligible impact" determinations

Any authorization to take marine mammals must result in the incidental take of only "small numbers of marine mammals of a species or population stock," and can have no more than a "negligible impact" on species and stocks.[84] Furthermore, NMFS must provide for the monitoring and reporting of such takings and must prescribe methods and means of effecting the "least practicable adverse impact" on the species or stock and their habitat.[85] The thresholds used in the proposed IHA do not reflect the best available science and the proposal does not meet the MMPA's requirement that authorized take only affect small numbers of animals and have a negligible impact.

In particular, adverse impacts on North Atlantic right whales are never negligible. USGS has requested authorization to take by harassment six North Atlantic right whales. These whales are critically endangered, with only approximately 450 individuals in existence.[86] NMFS has determined that even one mortality or serious injury, other than natural causes, of a North Atlantic right whale could have harmful population level impacts and impede recovery.[87] At present annual mortality and serious injury of right whales already exceeds this rate from entanglement in fishing gear and ship strikes, as right whales sustain an average of 4 serious injuries and mortalities each year.[88] Interference with feeding or mating that could occur from displacement or disturbance from the proposed survey could be harmful for the right whales.

NMFS has also blatantly disregarded the MMPA's prohibition on allowing the take of more than small numbers of marine mammals.[89] For example, the proposed take for pantropical spotted dolphins is 1,448.[90] This amounts to 43.44% of the stock. Although there is no numerical cut-off for "small numbers,"[91] courts have concluded that "[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."[92]

NMFS' explanation for how its take authorization is limited to small numbers is irrational. The agency cuts the anticipated take numbers by 80-90% -- by the portion of the project that occurs outside the U.S. EEZ. However, the MMPA clearly prohibits agencies from taking marine mammals on the high seas.[93] Since the take prohibition applies outside the EEZ as well as in U.S. waters, NMFS must make a negligible impact and small numbers determination to authorize take for the populations in both the U.S. EEZ and on the high seas outside the U.S. EEZ. Authorizing

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[84] *See* 16 U.S.C. § 1371(a)(5)(D)(i).
[85] 16 U.S.C. § 1371(a)(5)(A) & (D).
[86] National Marine Fisheries Service, Draft Stock Assessment Reports (North Atlantic right whale) (2013).
[87] 73 Fed. Reg. at 60,176.
[88] *Id.*
[89] 16 U.S.C. § 1371(a)(5)(D)(i).
[90] The potential biological removal for pantropical spotted dolphins is 17. National Marine Fisheries Service, Draft Stock Assessment Reports (2013).
[91] *See* H.R. Rep. No. 97-228 (1981), reprinted in 1981 U.S.C.C.A.N. 1458, 1469 ("[small numbers] is not capable of being expressed in absolute numerical limits.").
[92] *Natural Res. Def. Council v. Evans*, 279 F. Supp. 2d at 1129, 1152 (N.D. Cal. 2003).
[93] 16 U.S.C. § 1372(a)(1) ("it is unlawful for any person . . . .to take any marine mammal on the high seas"); *Ctr. for Biological Diversity v. Nat'l Science Found.*, 2002 U.S. Dist. LEXIS 22315 (N.D. Cal. 2002).

take of marine mammals outside the EEZ without complying with all MMPA take authorization requirements violates the MMPA.[94] Accordingly, NMFS must demonstrate compliance with these standards and may not issue the authorization without fully analyzing and authorizing all take contemplated under this action. Moreover, pantropical spotted dolphins may be quite vulnerable to seismic activities as documented by a 2004 stranding incident for which sonar activities could have been the cause.[95]

Finally, NMFS' reliance on marine mammal avoidance of the seismic survey to mitigate the take of marine mammals is improper. Rather, displacement of marine mammals by noise pollution is itself harassment. Furthermore, displacement of whales can drive them into shipping lanes increasing the likelihood of a collision with a vessel, or into fishing areas and risk entanglement.

3. Failure to analyze masking effects or set thresholds for masking

The proposed IHA fails to consider masking effects from the mixed impulsive/continuous noise source airguns. Some biologists have analogized the increasing levels of noise from human activities to a rising tide of "smog" that is already shrinking the sensory range of marine animals by orders of magnitude from pre-industrial levels.[96] Masking of natural sounds begins when received levels rise above ambient noise at relevant frequencies.[97] Accordingly, NMFS must evaluate the loss of communication space – and consider the extent of acoustic propagation – at far lower received levels than the proposed IHA currently employs.

Researchers at NOAA and Cornell have created a model that quantifies impacts on the communication space of marine mammals. That published model has already been applied to shipping noise off Massachusetts and off British Columbia, and the same researchers involved in the Massachusetts study have applied it to airgun surveys as well.[98] Additionally, researchers at

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[94] 16 U.S.C. § 1372(a)(1).

[95] NMFS, Stock Assessment Report for Pantropical Spotted Dolphin (*Stenella atenuata*): Western North Atlantic Stock (Oct. 2007).

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

[97] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009). *See also* Castellote, M., Clark, C.W., and Lammers, M.O., Potential negative effects in the reproduction and survival on fin whales (*Balaenoptera physalus*) by shipping and airgun noise (2010) (IWC Scientific Committee Doc. No. SC/62/E3).

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

BP, working with colleagues at the University of California and the North Slope Borough, are applying the model to an analysis of masking effects from seismic operations in the Beaufort Sea.[99] Remarkably, the proposed IHA – instead of applying the Cornell/NOAA model – simply states that masking effects on marine mammals would be "minor." Failure to adequately account for the toll of masking ultimately effects the accuracy of the agency's take and negligible impact findings.

4. Failure to set proper thresholds for hearing loss

As you know, NMFS is presently revising its criteria for temporary and permanent auditory impacts and, by extension, direct tissue injury.[100] Several of the signatories to this letter, based on consultation and review by three bioacousticians, have submitted extensive comments on the draft criteria, which address, among other issues, new data that have appeared since the Southall et al. study was published in 2007. These include, inter alia, data indicating that harbor porpoises experience threshold shift on exposure to airgun signals at substantially lower levels than the two mid-frequency cetaceans (bottlenose dolphins and beluga whales) previously tested.[101] None of these considerations, and few of the relevant studies appearing since 2007, appear to be discussed in the IHA.

Hearing loss remains a very significant risk where, as here, the agency has not required aerial monitoring as standard mitigation, appears unwilling to restrict operations in low-visibility conditions, has set safety zone bounds that are inadequate to protect high-frequency cetaceans, and has not firmly established seasonal exclusion areas for biologically important habitat. NMFS should take a conservative approach and apply a more precautionary standard.

5. Failure to set proper thresholds for high- and mid-frequency sources

NMFS has also failed to adequately consider the potential impacts from or set an appropriate take threshold for the survey's multi-beam echosounder and sub-bottom profiler. NMFS mentions but then discounts the 2008 mass stranding in Madagascar of 100 melon-headed whales associated with the use of a 12kHz multi-beam echosounder. This is the same frequency echosounder as the one proposed for use in this project. Instead, NMFS simply suggests that the risk "may be very low" because these systems are used worldwide and there is a lack of direct evidence – other than the melon-headed whale incident, of course – of other such responses. To

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201-222 (2009); Williams, R., Ashe, E., Clark, C.W., Hammond, P.S., Lusseau, D., and Ponirakis, D., Inextricably linked: boats, noise, Chinook salmon and killer whale recovery in the northeast Pacific, presentation given at the Society for Marine Mammalogy Biennial Conference, Tampa, Florida, Nov. 29, 2011 (2011).

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

[100] NOAA, Draft guidance for assessing the effects of anthropogenic sound on marine mammals: Acoustic threshold levels for onset of permanent and temporary threshold shifts (Dec. 23, 2013).

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

essentially discount and ignore such a significant stranding is in stark conflict with NMFS' obligation under the MMPA to ensure the least practicable impact.

6. Failure to Adequately Assess Impacts on the North Atlantic Right Whale

The highly endangered North Atlantic right whale (*Eubalaena glacialis*) is considered to be one of the most endangered species of large whales in the world. Indeed, as NMFS has repeatedly stated, "the loss of even a single individual [North Atlantic right whale] may contribute to the extinction of the species" and "preventing the mortality of one adult female a year" may alter this outcome. 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. 60,173, 60,173 (Oct. 10, 2008); 72 Fed. Reg. 34,632, 34,632 (June 25, 2007); 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001).

The affected study area abuts and enters the North Atlantic right whale year-round feeding and mating grounds. As discussed above, a single seismic source can significantly reduce right whale communication range on a population scale. Recent modeling from Cornell and NOAA shows the right whale to be particularly vulnerable to masking effects from airguns and other low-frequency noise given the acoustic and behavioral characteristics of its calls.[102] Seismic surveys in the North and Mid-Atlantic areas could add cumulatively to the high levels of noise that right whales already experience from commercial shipping in their foraging grounds and along their migratory route. The advent of airgun noise on top of these other acoustic intrusions could significantly affect right whale vital rates over large scales. For example, modeling of right whale foraging in the Great South Channel, an area subject to high levels of ship traffic, has found that decrements in the whales' sensory range had a larger impact on food intake than even patch-density distribution, and are likely to compromise fitness in this endangered species.[103]

In addition to the threat of noise impacts to right whales, any expansion of the EEZ and larger opening up of this region to oil and gas exploration and drilling poses the risk of increasing ship strikes, the leading cause of death for right whales. More than half (10 out of 14) of the post-mortem findings for right whales that died from significant trauma in the northwest Atlantic between 1970 and 2002 indicated that vessel collisions were a contributing cause of death (in the cases where presumed cause of death could be determined);[104] and these data are likely to

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[102] Clark et al., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources; Clark et al., Acoustic masking in marine ecosystems: intuitions, analysis, and implication.

[103] Mayo, C.S., Page, M., Osterberg, D., and Pershing, A., On the path to starvation: The effects of anthropogenic noise on right whale foraging success, North Atlantic Right Whale Consortium: Abstracts of the Annual Meeting (2008).

[104] Moore, M. J., Knowlton, A.R., Kraus, S.D., McLellan, W.A., and Bonde, R.K., Morphometry, gross morphology and available histopathology in North Atlantic right whale (*Eubalena glacialis*) mortalities (1970-2002), *Journal of Cetacean Research and Management* 6:199-214 (2004).

grossly underestimate the actual number of animals struck, as animals struck but not recovered, or not thoroughly examined, cannot be accounted for.[105]

Further, some types of anthropogenic noise have been shown to induce near-surfacing behavior in right whales, increasing the risk of ship-strike at relatively moderate levels of exposure, as noted in the next section below. It is possible that mid-frequency sub-bottom profilers and the multi-beam echosounder could produce the same effects – increasing the risk to right whales posed by other nearby ships – and both should be treated conservatively.

The study does not include any time-areas closures to reduce impacts on right whales, nor does it provide any quantitative or even detailed qualitative analysis of masking effects or other cumulative, sub-lethal impacts on right whales.

7. Failure to Adequately Assess Cumulative Impacts of the Activity

In its Draft Environmental Assessment – upon which the proposed IHA relies – USGS failed to adequately analyze the cumulative impacts of its survey. An agency must take a hard look at the cumulative impacts of the proposed action and determine and provide a meaningful analysis of the environmental impacts of these activities. "NEPA always requires that an environmental analysis for a single project consider the cumulative impacts of that project together with 'past, present and reasonably foreseeable future actions.'" CEQ's regulations for implementing NEPA emphasize that "[c]umulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The agency has failed to meet the statutory requirements of NEPA and its regulations because it improperly limited the scope of the EA and failed to include sufficient information on the cumulative impacts of the project on marine mammals, fish, and sea turtles. The agency's cumulative impacts analysis improperly discounts cumulative impacts because the noise pollution is temporary. This rationale is flawed because impacts can accumulate even if there is no accumulation of sound.

Acoustic disturbance can result in long-term avoidance or abandonment of habitat, particularly in naïve populations. For example, following a single Navy exercise in the Northern Bahamas, in 2000, 14 beaked whales and several other marine mammals stranded and virtually the entirety of the population disappeared from the area. Even if animals do not suffer death or permanent injury or habitat abandonment from a single event, recurring acoustic disturbance increases the likelihood that a seismic survey will interfere with essential functions such as breeding, feeding, and communications. Therefore, noise pollution even when temporary can have cumulative effects on animal populations.

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[105] Reeves, R.R., Read, A., Lowry, L., Katona, S.K., and Boness, D.J., Report of the North Atlantic right whale program review, 13–17 March 2006, Woods Hole, Massachusetts (2007) (prepared for the Marine Mammal Commission).

Moreover, regional populations or stocks of marine mammals, or other wildlife, may be repeatedly exposed to disturbance from seismic, sonar, and ship noise. NMFS and USGS must analyze both the auditory and behavioral impacts of repeated exposure to noise pollution on a population that may alter behavior. Repeated exposure that causes temporary threshold shift could amplify the impact of a subsequent exposure. In some animals, temporary threshold shift can result in permanent threshold shift. USGS must at least evaluate intermittent exposure to multiple seismic and other acoustically disturbing activities.

The cumulative impacts analysis must include a full evaluation of the cumulative impacts of oil and gas seismic surveys planned for and anticipated in the Atlantic; the NSF seismic survey off New Jersey and any other NSF or USGS planned surveys; and military training and testing sonar activities. The failure to evaluate the cumulative impacts of temporally and spatially adjacent activities in the environmental assessment falls short of NEPA's requirements and results in a misrepresentation of the activities ultimate impact.

Additionally, concurrent activities can accumulate sound in habitat, and the EA's determination that project is only a "minor contribution" to overall noise is flawed. NOAA has already developed cetacean noise maps for the mid-Atlantic area where this project occurs. It shows that certain areas are already ensonified by vessel traffic at levels that are near the thresholds for some acoustically sensitive species. USGS and NMFS must analyze the noise pollution cumulatively with the project. While the EA describes other proximate activities, it lacks meaningful analysis of the cumulative impacts of these projects.

8. Failure to Analyze Impacts on Fish and Other Species of Concern

The survey considered in the proposed IHA has the potential to detrimentally affect multiple fish species, harm vital fish habitat, and conflict with multiple fisheries. Indeed, airgun surveys are known to significantly affect the distribution of some fish species, which can impact commercial and recreational fisheries and could also displace or reduce the foraging success of marine mammals that rely on them for prey. As one study has noted, fishermen in various parts of the world have complained for years about declines in their catch rates during oil and gas airgun surveys, and in some areas have sought industry compensation for their losses.[106] Airguns have been shown experimentally to dramatically depress catch rates of some commercial fish species, by 40 to 80% depending on catch method, over thousands of square kilometers around a single array.[107] Large-scale displacement is likely to be responsible for the fallen catch rates: studies have shown both horizontal (spatial range) and vertical (depth) displacement in a number of

[106] McCauley *et al.*, Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure.

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

other commercial species on a similar spatial scale.[108] Impacts on fisheries were found to last for some time beyond the survey period, not fully recovering within 5 days of post-survey monitoring.[109] Airguns also have been shown to substantially reduce catch rates of rockfish, at least to the distances (less than 5 km) observed in the experiment.[110] Yet the IHA ignores the potential for acoustic impacts on Essential Fish Habitat and assumes without support that effects on both fish and fisheries would be localized and "minor." NMFS must improve its scant analysis.

V. COMPLIANCE WITH OTHER STATUTES

A. Magnuson-Stevens Fishery Conservation and Management Act ("Magnuson Act")

USGS did not provide any meaningful analysis of the proposed action's impacts on essential fish habitat. NMFS has a statutory obligation to consult on the impact of federal activities on essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act ("Magnuson Act").

The Magnuson Act requires consultation with NMFS when actions to be permitted, funded, or undertaken by a federal agency may adversely affect essential fish habitat. The statute defines adverse effect as "any impact that reduces quality and/or quantity of EFH [and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions." The essential fish habitat consultation should include an evaluation of the effects of the action on essential fish habitat and proposed mitigation. Upon receipt of an essential fish habitat assessment, NMFS is required to provide essential fish habitat conservation recommendations for federal actions that would adversely affect essential fish habitat. As required by Section 305(b)(4) of the Magnuson Act, the Federal agency must respond with a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activities on essential fish habitat and explain its reasons for not following any essential fish habitat conservation recommendations.

The EFH consultation here is inadequate because it assumes that noise does not affect habitat. This is in error because noise pollution is indeed a habitat concern. The EA is similarly inadequate in that it wrongly concludes that "[t]here would be no anticipated negative impacts on Essential Fish Habitat (EFH)."

As discussed above, the impacts of seismic surveys on fish are documented. Sound can impact fish habitat because it can alter the ability of fish to communicate, avoid predators, and locate

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

[109] Engås *et al.*, Effects of seismic shooting.

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

prey. Studies indicate auditory damage can result from noise, including airguns. Seismic surveys alter the habitat in ways that cause displacement and disturbance of fish and decreased catch, as well as mortality to fish eggs and larvae. Therefore, seismic surveys do impair essential fish habitat. The acoustic environment is a key element of habitat. Indeed, NMFS recently recognized that the best scientific data indicates that sound can be an essential characteristic of habitat. Accordingly, the agency identified noise as a primary constituent element of critical habitat for beluga whales.

The proposed project area is essential fish habitat for dozens of species. As noted in the EA, about 600 species of fish occur in the survey area It contains essential fish habitat for several highly migratory species, including albacore tuna, big eye tuna, bluefin tuna, skipjack tuna, yellowfin tuna, skipjack, swordfish, blue marlin, longbill spearfish, roundscale spearfish, white marlin, and several species of shark -- thresher, dusky, blue, white tip, bignosee, bigeye thresher, tiger, basking, longfin mako, and angel. There are also several adjacent coastal EFH areas, and the Georges Bank seamounts are unique habitat with rich fish biodiversity.

Some of the fish species with EFH in the project area are imperiled and vulnerable to negative impacts from the project. For example, juvenile and adult Atlantic bluefin tuna have essential fish habitat in the project area, and this imperiled fish uses deep waters from 50 meter isobaths to the extent of the U.S. EEZ along much of the Eastern Seaboard. Atlantic bluefin tuna remain overfished with overfishing occurring despite being at year 16 of a 20 year rebuilding plan. While fishing continues to be the primary threat to Atlantic bluefin tuna, seismic surveys have been linked to declines of tuna species. Muhling et al. (2011) estimated drastic reductions in probabilities of bluefin tuna larval occurrence in current spawning areas in the late spring: 39–61% by 2050 and 93–96% by the end of the 21st century.

White marlin forage from Cape Cod to Cape Hatteras. Juvenile EFH for white marlin extends almost the entire project area from the shelf break out to the U.S. EEZ and much of the area is also EFH for adults. The most recent stock assessment for white marlin suggests that the species has low productivity, has been declining since the beginning of the fishery, and is clearly overfished. White marlin has experienced significant declines in its Atlantic range coincident with its decline in abundance.

Atlantic cod also have EFH adjacent to and partly within the action area. Much of the coastal and offshore waters off New England out to the U.S. EEZ are EFH for Atlantic cod. According to NOAA's 2013 stock assessment, the Gulf of Maine spawning stock biomass is more than 80% below target levels. The Georges Bank spawning stock biomass currently constitutes only seven percent of the agency's goal. Moreover, "[r]ecruitment for both stocks has been well below average in nearly every year since the 1980s."

Dusky and thresher sharks have habitat along the coast and off the continental shelf break. Dusky sharks are considered a species of concern by NMFS and have declined to approximately 15 to 20% of their 1970 abundance levels. Sharks are long-lived and have low fecundity thus making them vulnerable to depletion. Dusky sharks are classified as endangered under the IUCN Redlist.

Thresher sharks in the Atlantic are declining and have declined by about 70% and are considered vulnerable by the IUCN.

The agencies should have identified which areas of essential fish habitat are within the project area and evaluated the impact of the proposed project on those habitat areas. Ultimately, NMFS should have considered mitigation, alternatives, and recommended conservation actions that would protect essential fish habitat.

B. Endangered Species Act ("ESA")

Section 7(a)(2) of the ESA requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species . . . determined . . . to be critical . . . ." To accomplish this goal, agencies must consult with the delegated agency of the Secretary of Commerce or Interior whenever their actions "may affect" a listed species. NMFS has the discretion to impose terms, conditions, and mitigation on any authorization.

The ESA not only bans the acts of parties directly causing a take, but also bans the acts of third parties whose acts bring about the taking. NMFS may not approve the seismic survey unless it first obtains authorization for take under the ESA.

NMFS' decision to issue an incidental harassment authorization is an action triggering the duty to comply with section 7 of the ESA. The ESA's consultation requirement applies to Federal agencies taking any action. NMFS states that it is engaged in formal consultation on the proposed seismic survey.

As described thoroughly above, the seismic survey puts several ESA-listed species at risk. Listed species affected include blue, fin, humpback, North Atlantic right, sei, and sperm whales. The proposed seismic surveys can have harmful impacts on listed marine mammals, which must be fully and accurately vetted through the consultation process. Accordingly, NMFS must complete consultation and obtain any take authorizations before authorizing the proposed seismic survey here. Moreover, NMFS should adopt robust mitigation measures such as those described in the alternatives section above to avoid adverse impacts to listed species.

NMFS' reliance on the 160-dB Level B and 180/190 Level A thresholds do not reflect the best available science. As described above, the best available science supports lower thresholds for many marine species. The ESA requires the use of the best available science.

Additionally, NMFS should also evaluate the impact on new sea turtle and potential right whale critical habitat. The survey area occurs partly in newly designated critical habitat for North Atlantic loggerhead sea turtles. This designation includes migratory habitat and overwintering habitat in the nearshore waters, as well as offshore sargassum habitat adjacent to or in the project area. NMFS must therefore evaluate the impact of the proposed activity on loggerhead sea turtles and their habitat. The final critical habitat rule notes that noise pollution is considered an

activity that could alter habitat conditions in migratory pathways for the loggerhead sea turtles. The survey area is also located southeast of currently designated Northeast right whale critical habitat – an area which was designated because it represents the species' feeding habitat. Recent studies have further shown that mid-Atlantic coastal areas is a key migratory route between calving and feeding grounds. NMFS has indicated that it intends to amend the current critical habitat to potentially include the coastal area adjacent to the survey area, but has substantially delayed issuing its proposal. See 75 Fed. Reg. 61,690 (Oct. 6, 2010) (indicating the agency had already begun developing the amendment and would publish a proposed rule "in the second half of 2011"). Accordingly, NMFS should consider how the seismic survey may impact habitat that is under consideration for designation for North Atlantic right whales.

In sum, NMFS must fully comply with the ESA and develop a robust biological opinion based on the best available science. We further urge NMFS to establish more stringent mitigation measures to protect ESA-listed species than are currently proposed by the IHA.

C. Coastal Zone Management Act ("CZMA")

The CZMA requires that applicants for federal permits to conduct an activity affecting a natural resource of the coastal zone of a state "shall provide in the application to the licensing or permitting agency a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity will be conducted in a manner consistent with the program." The marine mammals and fish that will be affected by the seismic survey are all "natural resources" protected by the coastal states' coastal management programs. Accordingly, states should be given the opportunity to review the IHA for consistency with their coastal management programs.

VI. CONCLUSION

For the above reasons, and in light of the serious potential impacts of the proposed study, we urge that NMFS deny the IHA or USGS withdraw its application. At minimum, USGS should revise its proposed mitigation measures in the ways discussed above, including by redrawing its survey lines to reflect well-established areas of heightened biological significance and by providing meaningful site-specific analysis.

Very truly yours,

Michael Jasny
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/S/ Sharon Young

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July 23, 2014

Via electronic mail sent to ITP.Goldstein@noaa.gov
Ms. Jolie Harrison
Supervisor, Incidental Take Program
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Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
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RE: Comments on the National Marine Fisheries Service Incidental Harassment Authorization for the Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Marine Geophysical Survey in the Atlantic Ocean off the Eastern Seaboard, August to September 2014 and April to August 2015 (RIN 0648-XD214)

Dear Ms. Harrison:

Clean Ocean Action (COA) submits the following comments in response to the National Marine Fisheries Service (NMFS) request for comments for the proposed incidental harassment authorization (IHA) for the takes of marine mammals incidental to a marine geophysical survey in the Atlantic Ocean off the Eastern Seaboard, August to September 2014 and April to August 2015 (RIN 0648-XD214).[1]

The United States Geological Survey (USGS), Lamont-Doherty Earth Observatory of Columbia University (L-DEO), and the National Science Foundation propose to conduct a 2-D seismic vessel survey in the Atlantic Ocean off the Eastern Seaboard between August and September 2014 and April and August 2015 to identify the outer limits of the United States continental shelf and study potential tsunami-related hazards ("Proposed Project"). The Proposed Project includes the use of an array of 36 airguns with a total volume of approximately 6,600 in^3, in conjunction with a multibeam echosounder and a sub-bottom profiler. The nominal source levels of the airgun arrays range from 236 to 265 decibels (dB) re: 1 µPa (peak-to-peak), and airguns would fire every 20 to 24 seconds, 24 hours a day, for a17 to 18 day period set to commence on August 15, 2014. Similar survey activities will also be conducted in an as yet unconfirmed timeframe between April and August 2015. The area to be surveyed is an irregularly shaped region of the Atlantic Ocean continental shelf that is positioned between 241 km (130 nmi) and 648.2 km (350 nmi) from the coast of the United States.

[1] 79 Fed. Reg. at 35642 (Monday, June 23, 2014) (hereafter "NMFS IHA").

NMFS issued its proposed IHA for takes of 19,497 marine mammals by harassment under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA). The Proposed Project is subject to regulations under the National Environmental Policy Act (NEPA) and must also request a Section 7 Consultation under the Endangered Species Act (ESA)[2] and an Essential Fish Habitat assessment under the Magnuson-Stevens Fishery Conservation and Management Act.[3]

For the reasons detailed herein, Clean Ocean Action urges denial of the NMFS IHA on the grounds that a full Environmental Impact Statement (EIS) should be completed and the potential impacts to marine mammals are incompatible with the goals, mandates, and prohibitions of the MMPA. A full EIS is necessary to remedy issues of incomplete information, inadequate assessment of impacts, and insufficient evaluation of alternatives and mitigation measures. Importantly, the Proposed Project should not be conducted during the spring and summer months, which are the peak of marine mammal (and other marine species) feeding, breeding, and/or calving activity off the mid-Atlantic coast. Moreover, NMFS should ensure that best available science and regulatory review are incorporated into the EIS and IHA, require stronger mitigation measures, and consider different times of year for the Proposed Project.

II. NOAA must prepare a specific EIS because there are significant environmental impacts from the Proposed Project

For the reasons discussed below, we strongly urge NMFS to prepare an EIS for this project prior to the further consideration of the issuance of an IHA. We understand that an EA was drafted in May 2014 for this project; this document tiers to a Programmatic EIS that was finalized in 2011. Given the broad scope of this PEIS and the restricted scope of the May 2014 EA, an updated EIS would provide information necessary to making an informed decision about issuance of the IHA. Specifically, an EIS would include complete scientific substantiation for the project, a thorough analysis of all direct, indirect, and cumulative environmental impacts (including use of the acoustic guidelines that NOAA recently drafted and received comments on, which account for best available science), and in-depth consideration of a full range of alternatives to the project. Moreover, to meet its NEPA obligations, the NEPA document must be made available for public review and comment.[4]

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[2] Section 7 of the ESA (16 U.S.C. 1531 et seq.) outlines the procedures for Federal interagency cooperation to conserve federally-listed species and designated critical habitats.

[3] Public Law (P.L.) 94-265, as amended by the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (P.L. 109-479). EFH Guidelines at 50 CFR 600.05-600.930 outline the process to satisfy EFH consultation under Section 305(b)(2)-(4)) of the MSA.

[4] *See, e.g. Anderson v. Evans*, 314 F.3d 1006, 1016 (9th Cir. 2002) ("the public must be given an opportunity to comment on draft EAs and EISs").

A. Purpose of NEPA and EA and trigger for an EIS

NEPA's fundamental purposes are to guarantee that: (1) agencies take a hard look at the environmental consequences of their actions before these actions occur; and (2) agencies make the relevant information available to the public so that it may also play a role in both the decision-making process and the implementation of that decision.[5] To assure transparency and thoroughness, agencies also must "to the fullest extent possible...[e]ncourage and facilitate public involvement" in decision-making.[6] Despite the fact that a draft Environmental Assessment (EA) was released in May 2014, the public was not offered an opportunity to comment on the Proposed Project until the issuance of the proposed IHA on June 23, 2014, less than two months before the study was scheduled to begin.

The purpose of an EA is to assist the agency in determining whether the project may significantly affect the environment and therefore require a full EIS.[7] An agency may avoid preparing a full EIS if the agency: (1) prepares an environmental assessment identifying and analyzing the action's environmental effects; and (2) makes a finding of no significant impact, which presents the agency's reasons for concluding that the action's environmental effects are not significant.[8] NEPA requires federal agencies to prepare an EIS for all "major federal actions significantly affecting the quality of the human environment."[9] A full EIS is required if "substantial questions are raised as to whether a project...may cause significant degradation of some human environmental factor."[10] To trigger this requirement, the plaintiff "need *not show* that significant effects will *in fact* occur;" but rather, "raising substantial questions whether a project may have a significant environmental effect is sufficient."[11]

Whether an action may have "significant" impacts on the environment is determined by considering the "context" and "intensity" of the action.[12] "Context" means the significance of the project "must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality."[13] Intensity of the action is

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[5] See, e.g. 40 C.F.R. § 1500.1.
[6] 40 C.F.R. §1500.2(d
[7] 42 U.S.C. §4332(2)(C); 40C.F.R. §1508.9.
[8] 40 C.F.R. §§ 150l.4(b), (e); 1508.9; 1508.1.3.
[9] 42 U.S.C. § 4332(2)(C); see also 40 C.F.R. § 1501.4. The Act defines the "human environment" as including "the natural and physical environment and the relationship of people with that environment…This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment." 40 C.F.R. § 1508.14.
[10] *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1149-50 (9th Cir. 1998).
[11] *Id*. (emphases in original).
[12] 40 C.F.R. § 1508.27.
[13] Id. § 1508.27(a).

determined by considering the following factors: (1) impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial; (2) the degree to which the proposed action affects public health or safety; (3) unique characteristics of the geographic area such as proximity to ecologically critical areas; (4) the degree to which the effects on the quality of the human environment are likely to be highly controversial; (5) the degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks; (6) the degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration; (7) whether the action is related to other actions with individually insignificant but cumulatively significant impacts; (8) the degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources; (9) the degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the federal Endangered Species Act; (10) whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.[14] The presence of one or more significant effects can trigger the need for a full EIS.[15] Based on the nature of potential impacts to marine life from the Proposed Project and the incomplete analysis of such impacts in the EA (discussed further below), a full EIS must be prepared for this study and the issuance of an IHA before this process is completed would be premature. Furthermore, given that the EA drafted for the Proposed Project tiers to a Programmatic EIS that was finalized in 2011, an updated EIS would provide information necessary to making an informed decision about issuance of the IHA.

B. Potential impacts from sound-producing sources other than seismic airguns were not evaluated.

Neither the NMFS IHA nor the EA upon which it relies have offered any meaningful evaluation of the potential impacts that other sound-producing sources used in the Proposed Project may have on marine species. Of particular concern, the NMFS IHA indicates that a high-frequency Kongsberg EM 122 multibeam echosounder will operate concurrently with airgun operations. The multibeam echosounder produces sound in the 10.5 to 13.0 kHz frequency range, which is within the optimal hearing spectrum for many odontocete species that may occur in the study area. A 12-kHz multibeam echosounder system operated by an Exxon survey vessel off the

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[14] 40 C.F.R. § 1508.27(b)(1)-(10).

[15] *See, e.g. Nat'l Parks & Conserv. Ass'n. v. Babbitt*, 241 F.3d 722, 731 (9th Cir. 2001) (either of two significance factors considered by the court "may be sufficient to require preparation of an EIS in appropriate circumstances"); *Anderson v. Evans*, 350 F.3d 815, 835 (9th Cir. 2003) (presence of one or more factors can necessitate preparation of a full EIS).

coast of Madagascar was implicated by an independent scientific review panel (ISRP) in the mass-stranding of approximately 100 melon-headed whales (*Peponocephala electra*) in 2008.[16] The report of the ISRP stated, "all other possible factors considered were determined by the ISRP to be unlikely causes for the initial behavioral response."[17]

Furthermore, a 2002 seismic expedition in the Gulf of California, also lead by L-DEO, employed a similar multibeam sonar system with a center frequency of 15.5 kHz and source levels of 237 dB. Beaked whale strandings observed in the area of the survey in September 2002 may have been linked to the use of this technology – a federal judge responded by ordering the ship to cease operations.[18]

Based on the correlation between these previous stranding events and the use of multibeam sonar technology, it is imperative that NMFS fully assess the potential for this source to impact marine mammals both on its own and in concert with seismic airgun blasts.

C. The analysis of alternatives in the EA was incomplete.

The "heart" of the NEPA process is an agency's duty to consider "alternatives to the proposed action" and to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[19] The CEQ regulations require NMFS to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."[20] "A 'viable but unexamined alternative renders [the] environmental impact statement inadequate.'"[21]

The EA does not devote sufficient discussion to alternatives, including alternative times of year and additional mitigation and monitoring activities. In its discussion of the No Action alternative, the EA does not adequately qualify the benefits of the No Action alternative, in which the Proposed Project would not proceed and 19,497 marine mammals would not be subject to harassment, in relation to the costs. The "Alternative Action" alternative does not

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[16] Southall, B.L., Rowles, T., Gulland, F., Baird, R. W., and Jepson, P.D. 2013. Final report of the Independent Scientific Review Panel investigating potential contributing factors to a 2008 mass stranding of melon-headed whales (*Peponocephala electra*) in Antsohihy, Madagascar.

[17] Id.

[18] Cox, T.M., Ragen, T.J., Read, A.J., Vos, E., Baird, R.W., Balcomb, K., Barlow, J., Caldwell, J., Cranford, T., Crum, L., D'Amico, A., D'Spain, G., Fernandez, A., Finneran, J., Gentry, R., Gerth, W., Gulland, F., Hildebrand, J., Houser, D., Hullar, T., Jepson, P.D., Ketten, D., MacLeod, C.D., Miller, P., Moore, S., Mountain, D.C., Palka, D., Ponganis, P., Rommel, S., Rowles, T., Taylor, B., Tyack, P., Wartzok, D., Gisiner, R., Mead, J., and Benner, L. 2006. Understanding the impacts of anthropogenic sound on beaked whales. *Journal of Cetacean Resource Management* **7**: 177-187.

[19] 42 U.S.C. §§ 4332(2)(C)(iii), 4332(2)(E).

[20] 40 C.F.R. § 1502.14(a).

[21] *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 814 (9th Cir. 1999) (quoting *Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1057 (9th Cir. 1985)).

actually evaluate any alternate times of year to conduct the survey, which are important considerations that deserve full assessment given the magnitude of marine mammal takes during the proposed study periods.

The two legs of the Proposed Project are planned to take place between the spring and late summer (August to September 2014 and April to August 2015). This timeframe is of critical importance to many cetacean species that may occur in the study area, including several endangered species. The critically endangered North Atlantic right whale migrates northward to the waters off New England and the Bay of Fundy in the spring and summer months, and is also feeding and nursing during this time period.[22] Other species known to feed, breed, and/or calve in the area of the Proposed Project during this timeframe include the Minke whale,[23] Bryde's whale,[24] sei whale,[25] fin whale,[26] blue whale,[27] sperm whale,[28] pygmy sperm whale,[29] dwarf sperm whale,[30] northern bottlenose whale,[31] bottlenose dolphin,[32] Atlantic white-sided dolphin, Atlantic spotted dolphin, pantropical spotted dolphin,[33] striped dolphin, spinner dolphin,[34] Clymene dolphin,[35] short-beaked common dolphin,[36] Risso's dolphin,[37] melon-

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[22] NOAA Fisheries, Office of Protected Resources. North Atlantic Right Whales (*Eubalaena glacialis*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale_northatlantic.htm.
[23] NOAA Fisheries, Office of Protected Resources. Minke Whale (*Balaenoptera acutorostrata*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/minkewhale.htm.
[24] NOAA Fisheries, Office of Protected Resources. Bryde's Whale (*Balaenoptera edeni*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/brydeswhale.htm.
[25] NOAA Fisheries, Office of Protected Resources. Sei Whale (*Balaenoptera borealis*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/seiwhale.htm.
[26] NOAA Fisheries, Office of Protected Resources. Fin Whale (*Balaenoptera physalus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm.
[27] NOAA Fisheries, Office of Protected Resources. Blue Whale (*Balaenoptera musculus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bluewhale.htm.
[28] NOAA Fisheries, Office of Protected Resources. Sperm Whales (*Physeter macrocephalus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm.
[29] NOAA Fisheries, Office of Protected Resources. Pygmy Sperm Whale (*Kogia breviceps*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/pygmyspermwhale.htm.
[30] NOAA Fisheries, Office of Protected Resources. Dwarf Sperm Whale (*Kogia sima*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/dwarfspermwhale.htm.
[31] NOAA Fisheries, Office of Protected Resources. Northern Bottlenose Whale (*Hyperoodon ampullatus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/northernbottlenosewhale.htm.
[32] NOAA Fisheries, Office of Protected Resources. Bottlenose Dolphin (*Tursiops truncatus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bottlenosedolphin.htm.
[33] NOAA Fisheries, Office of Protected Resources. Pantropical Spotted Dolphin (*Stenella attenuata*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spotteddolphin_pantropical.htm.
[34] NOAA Fisheries, Office of Protected Resources. Spinner Dolphin (*Stenella longitrostris*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spinnerdolphin.htm.
[35] NOAA Fisheries, Office of Protected Resources. Clymene Dolphin (*Stenella clymene*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/clymenedolphin.htm.
[36] NOAA Fisheries, Office of Protected Resources. Short-Beaked Common Dolphin (*Delphinus delphis*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/commondolphin_shortbeaked.htm.

headed whale,[38] false killer whale,[39] killer whale,[40] and short-finned pilot whale.[41] Based on the high frequency of vital behaviors that take place in the spring and summer months, it is prudent for NMFS to assess alternate times of year for the Proposed Project, especially during the winter, when many species may be located outside of the survey area.

Should it be determined that the Proposed Project must continue as planned for the summer of 2014 and spring/summer of 2015, we urge NMFS to consider alternatives with stronger mitigation measures including pre-survey observations, aerial surveys, larger exclusion zones and lower sound thresholds, suspension of activities in low light and night conditions (or at the very least, requiring visual observers equipped with night-vision technologies during these conditions), post-survey monitoring, and other methods to detect marine mammals beyond visual observation and acoustic monitoring.

II. NMFS must ensure that its IHA complies with the MMPA.

The MMPA places a "moratorium on the taking" of marine mammals.[42] Any authorization to take marine mammals must result in the incidental take of only "small numbers of marine mammals of a species or population stock," and can have no more than a "negligible impact" on species and stocks. Furthermore, NMFS must provide for the monitoring and reporting of such takings and must prescribe methods and means of affecting the "least practicable adverse impact" on the species or stock and their habitat.[43]

A. Scientific evidence supports marine mammal harassment below the 160-dB Level B threshold and potential for injury below the 180/190-dB Level A threshold

The proposed IHA uses the single sound pressure level of 160 dB re 1 µPa (RMS) as a threshold for behavioral, sub-lethal take in all marine mammal species affected by the proposed survey.[44] This approach does not reflect the best available science, and the choice of threshold is not sufficiently conservative in several important respects. In fact, five of the world's leading biologists and bioacousticians working in this field recently characterized the 160-dB threshold

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[37] NOAA Fisheries, Office of Protected Resources. Risso's Dolphin *(Grampus griseus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rissosdolphin.htm.
[38] NOAA Fisheries, Office of Protected Resources. Melon-headed Whale (*Peponocephala electra*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/melonheadedwhale.htm.
[39] NOAA Fisheries, Office of Protected Resources. False Killer Whale (*Pseudorca crassidens*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/falsekillerwhale.htm.
[40] NOAA Fisheries, Office of Protected Resources. Killer Whale (*Orcinus orca*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/killerwhale.htm.
[41] NOAA Fisheries, Office of Protected Resources. Short-finned Pilot Whale (*Globicephala macrorhynchus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/pilotwhale_shortfinned.htm.
[42] 16 U.S.C. § 1371(a).
[43] 16 U.S.C. § 1371(a)(5)(A) & (D).
[44] 79 Fed. Reg. at 14801.

as "overly simplified, scientifically outdated, and artificially rigid."[45] Furthermore, NMFS has released draft acoustic guidance that is currently being finalized; these guidelines should be incorporated into take estimations.

Using a single sound pressure level of 160-dB for harassment represents a major step backward from recent programmatic authorizations. For Navy sonar activity, for example, NMFS has incorporated linear risk functions into its analysis, which endeavor to account for risk and individual variability and to reflect the potential for take at relatively low source levels.[46]

Furthermore, current scientific literature establishes that behavioral disruption can occur at substantially lower received levels for some marine mammal species, including these that will be impacted by the Proposed Project. For example, the startup of a seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging.[47] Similarly, a low-frequency, high-amplitude fish shoal imaging device was recently found to silence humpback whales at a distance of up to 200 kilometers, where received levels ranged from 5 to 22 dB above ambient noise levels.[48] Groups of humpback whales in the wild have been observed to exhibit avoidance behaviors at a distance of two kilometers from a small airgun array; the received levels in these trials were 159 dB re: 1 μPa^2 peak-to-peak.[49] Blue whale behavioral changes in response to a small airgun array have also been monitored. Researchers tracked a blue whale traveling and vocalizing in the vicinity of a vessel firing a four-gun array with a source level of 215 dB re: 1 μPa^2 peak-to-peak and noted that at a distance of 10 kilometers from the vessel (where the received level was estimated to be 143 dB re: 1 μPa^2 peak-to-peak), the whale ceased vocalizations for an hour and noticeably changed course.[50] The literature also shows that harbor porpoises are acutely sensitive to a range of anthropogenic sounds, including airguns. They have been observed to engage in avoidance responses 50 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

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

[46] *See, e.g.*, 74 Fed. Reg. 4844, 4844-4885 (Jan. 27, 2009).

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

[48] Risch, D., Corkeron, P.J., Ellison, W.T., and van Parijs, S.M., Changes in humpback whale song occurrence in response to an acoustic source 200 km away, PLoS ONE 7(1): e29741. doi:10.1371/journal.pone.0029741 (2012).

[49] McCauley, R.D., Jenner, M.N., Jenner, C., McCabe, K.A., and Murdoch, J. 1998. The response of humpback whales (*Megaptera novaeangliae*) to offshore seismic survey: Preliminary results of observations above a working seismic vessel and experimental exposures. *Appea Journal*: 692-706.

[50] McDonald, M.A., Hildebrand, J.A., and Webb, S.C. 1995. Blue and fin whale observed on a seafloor array in the Northeast Pacific. *Journal of the Acoustical Society of America* **98**: 712-721.

at very low received levels, well below 120 dB.[51] Cuvier's beaked whales exhibited alarming behavioral impacts when exposed to sonar at low received levels of 89-127dB re: 1 µPa.[52]

Furthermore, evidence in the scientific literature has indicated that temporary threshold shifts (TTS) can occur in cetaceans at source levels lower than proposed for this survey. As NMFS itself cites, a recent study involved the exposure of a captive harbour porpoise to one airgun firing on three occasions at an average source level of 201 dB re: 1 μPa^2 peak-to-peak.[53] In addition to avoidance behavior exhibited by the animal during the trials, the researchers estimated through modeling that the onset of TTS that did not fully subside until *55 hours after exposure*.[54] Moreover, NMFS cannot rationally assume that other marine mammals will not incur injury at noise levels below those in the Proposed Project. The Lucke *et al.* study demonstrates that TTS can occur at different levels for different species of cetaceans. Moreover, controlled exposure trials in which harbor seals were exposed to small airguns firing for one hour at source levels ranging from 215 to 224 dB re: 1 μPa^2 peak-to-peak revealed dramatic physiological and behavioral responses, including a fright response evidenced by significant drops in heart rate; decreased stomach temperatures indicating a cessation of feeding; and rapid swimming away from the noise source.[55] Thus, NMFS cannot assume that TTS and even permanent threshold shifts (PTS) would be unlikely for marine mammals in the area of this Proposed Project.

A number of other recent studies indicate that anthropogenic sound can induce PTS at lower levels than anticipated.[56] New data indicate that mid-frequency cetaceans have greater

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

[52] DeRuiter, S.L., Southall, B.L., Calambokidis, J., Zimmer, W.M.X., Sadykova, D., Falcone, E.A., Friedlaender, A.S., Joseph, J.E., Moretti, D., Schoor, G.S., Thomas, L., and Tyack, P.L. 2013. First direct measurements of behavioural responses by Cuvier's beaked whales to mid-frequency active sonar. *Biology Letters* **9**: 20130223 1 (2013).

[53] Lucke, Klaus, Siebert, U., Lepper, P. a, & Blanchet, M.-A. (2009). 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.

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

[55] Thompson, D., Sjoberg, M., Bryant, M.E., Lovell, P., and Bjorge, A. 1998. Behavioral and physiological responses of harbour (*Phoca vitulina*) and grey (*Halichoerus grypus*) seals to seismic surveys. Report to European Commission of BROMMAD Project. MAS2 C7940098.

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

sensitivity to sounds within their best hearing range than was previously thought.[57] NMFS must also consider that even behavioral disturbance can amount to a Level A take if it interferes with essential life functions. For example, TTS can impair reproductive success and fitness that would constitute harm or Level A harassment. Beaked whales are sensitive to noise, and it is not necessarily the auditory damage that causes the injury. Sounds cause beaked whales to change their behavior, including panic response and rapid surfacing, which results in an injury similar to decompression sickness ("the bends").[58]

Although the proposed IHA NMFS cites many studies that show low-frequency sounds in general and seismic surveys in particular can have significant behavioral impacts to marine mammals well below 160 dB,[59] NMFS nonetheless continues to rely upon a Level B harassment threshold of 160 dB. Additionally, in light of the best available science, NMFS cannot rationally defend its conclusion that the proposed survey will not lead to any Level A impacts and will have no more than negligible impacts on these species or stocks. As such, NMFS should modify its threshold estimates; this would in turn lead to larger exclusion zones around the survey and may significantly increase the estimated number of marine mammal takes incidental to the Proposed Project.

III. NMFS must take best available science and the precautionary principle into account.

Several experts in marine mammal bioacoustics have underscored our extremely limited understanding of the potential auditory and behavioral impacts to marine mammals from the use of seismic airguns and other sound-producing technologies. Darlene R. Ketten, a marine biologist and neuro-anatomist at the Woods Hole Oceanographic Institution, has written, "[a]t this time we have insufficient data to accurately predetermine the underwater acoustic impact for anthropogenic sources."[60] Other published scientists have noted, "[g]iven the current state of knowledge…the risk of seismic sources causing hearing damage to marine mammals cannot be dismissed as negligible."[61] Scientists have also commented on the variability in how a seismic source could affect a marine mammal based on the orientation of the source relative to

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[57] See discussion in Wood, J., Southall, B.L. and Tollit, D.J. 2012. PG&E offshore 3-D Seismic Survey Project EIR – Marine Mammal Technical Draft Report. SMRU Ltd.; Marine Mammal Commission, Marine Mammals and Noise: A Sound Approach to Research Management, Report to Congress, at 46 (March 2007).

[58] Cox, T.M., Ragen, T.J., Read, A.J., Vos, E., Baird, R.W., Balcomb, K., Barlow, J., Caldwell, J., Cranford, T., Crum, L., D'Amico, A., D'Spain, G., Fernandez, A., Finneran, J., Gentry, R., Gerth, W., Gulland, F., Hildebrand, J., Houser, D., Hullar, T., Jepson, P.D., Ketten, D., MacLeod, C.D., Miller, P., Moore, S., Mountain, D.C., Palka, D., Ponganis, P., Rommel, S., Rowles, T., Taylor, B., Tyack, P., Wartzok, D., Gisiner, R., Mead, J., and Benner, L. 2006. Understanding the impacts of anthropogenic sound on beaked whales. *Journal of Cetacean Resource Management* **7**: 177-187.

[59] 79 Fed. Reg. at 14787.

[60] Ketten, D.R. Marine Mammal Auditory Systems: A Summary of Audiometric and Anatomical Data and Implications for Underwater Acoustic Impacts. Polarforschung, 72. Jahrgung, Nr. 2/3, pp. 79-92.

[61] Gordon, J.C.D., Gillespie, D., Potter, J., Frantzis, A., Simmonds, M.P., Swift, R., and Thompson, D. 2004. A Review of the Effects of Seismic Survey on Marine Mammals. *Marine Technology Society Journal* **37**: 14-32.

the animal, which is not considered in the Proposed Project. A 2004 review paper on the effects of seismic surveys on marine mammals stated, "[m]arine mammals will be distributed in a variety of positions relative to a seismic array and the signal they receive may have a complicated and variable nature."[62] A study of the environmental implications of marine seismic surveys conducted in Australia published in 2000 concluded, "[i]t was believed slight differences in the orientations of receivers to each array, alignments and depths of array components and of functioning air guns within each array contributed to the measured differences. Again this exemplified the difficulty of predicting the received air gun level for a specific air gun array."[63]

Because of this high degree of uncertainty in our understanding of impacts to marine mammals from airgun sources, compounded by the variability in the level of impact based on the position of the source relative to a marine mammal, NMFS should be precautionary in its assessment of incidental takes. Precaution and use of the best available science are fundamental tenets of the Obama Administration's National Ocean Policy. One of the Principles in the 2010 Final Recommendations of the Interagency Ocean Policy Task Force report urges the use of best available science and the precautionary approach: "Decisions affecting the ocean…should be informed by and consistent with the best available science. Decision-making will also be guided by a precautionary approach as reflected in the Rio Declaration of 1992."[64] Responsible application of the precautionary principle to the NMFS IHA would reasonably have led to the denial of marine mammal takes incidental to the Proposed Project.

IV. NMFS's take estimates for marine mammals for which no population or stock data are available are speculative and may be significant underestimations.

The NMFS IHA acknowledges that "No known current regional population or stock abundance estimates for the northwest Atlantic Ocean are available for…eight…species under NMFS's jurisdiction that could potentially be affected by Level B harassment over the course of the IHA,"[65] and yet still determines that takes of these species will be negligible. These species include the Bryde's whale, Fraser's dolphin, spinner dolphin, Clymene dolphin, melon-headed whale, pygmy killer whale, false killer whale, and killer whale. NMFS has assigned take

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[62] Id.

[63] McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M-N., Penrose, J.P., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K. 2000. Marine seismic surveys – A study of environmental implications. *Appea Journal* 692-708.

[64] The White House Council on Environmental Quality. Final Recommendations Of The Interagency Ocean Policy Principle 15 of the Rio Declaration 1992 reads, "in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation."

[65] 79 Fed. Reg. at 35671.

estimates for these species based on old data or on population or stock abundance from other oceanic regions, without further indication of how these data were applied to the Proposed Project area. In total, takes of over 1,000 individuals from these eight species are authorized. In the absence of any data from the region in which the survey is to take place, it is not clear how these takes were assigned and what, if any, measures would be taken during the survey if it is determined that take numbers for these animals were significantly miscalculated.

V. Conclusion

For the reasons detailed above, Clean Ocean Action urges denial of the NMFS IHA. The Proposed Project threatens serious harm to numerous species of marine mammals and is therefore contrary to the goals, mandates, and prohibitions of the MMPA. Furthermore, a full EIS should be completed prior to the consideration of the IHA, to remedy issues of incomplete information, inadequate assessment of impacts, and insufficient evaluation of alternatives and mitigation measures. Importantly, the Proposed Project should not be conducted during the spring and summer months, which are the peak of marine mammal (and other marine species) feeding, breeding, and/or calving activity off the mid-Atlantic. Moreover, NMFS should ensure that best available science and regulatory review are incorporated into the EIS and IHA, require stronger mitigation measures, and consider different times of year for the Proposed Project.

Sincerely,

Cindy Zipf
Executive Director
Clean Ocean Action

Cassandra Ornell
Staff Scientist
Clean Ocean Action

Howard Goldstein - NOAA Federal <howard.goldstein@noaa.gov>

Fwd: Atlantic seismic testing by USGS

Pr Webmaster - NOAA Service Account <pr.webmaster@noaa.gov> Mon, Jul 28, 2014 at 9:52 AM
To: Howard Goldstein - NOAA Federal <howard.goldstein@noaa.gov>

And another -

---------- Forwarded message ----------
From: **connie nunemaker** <cnnature@hotmail.com>
Date: Sun, Jul 27, 2014 at 9:52 PM
Subject: Atlantic seismic testing by USGS
To: "PR.Webmaster@noaa.gov" <pr.webmaster@noaa.gov>

I was amazed and horrified to read recently that the USGS intends to do, or may already be doing, seismic research on the ocean floor during August and September 2014 and the same times next year. This seems to be a disaster in the making for all east coast marine life, for the fishing industry, and for tourism. The proposed sound levels of 236 to 265 decibels every 20-24 seconds for 17 days can't help but injure or kill marine animals, many of which use sound to find each other or as a tool for feeding.

John Haines, study originator with the USGS, with his claim that the research will be low impact, and that steps will be taken to minimize harm to marine animals, including stopping when animals are seen nearby, clearly doesn't understand the marine environment. According to one article, observers will use binoculars or telescopes to be sure there are no marine animals in the area. Will these also be arrayed at 20-foot intervals all around and under the water surrounding the 3-square-mile area in which testing is done, to be sure no fish, sharks, seals, or other animals come into the area? Many animals, exposed to such incredible and continuous bombardment of sounds for such a long period of time will not survive. Northern right whales are one species of concern in the area of proposed testing, being the most endangered of large whales.

I hope the NOAA recognizes the terrible consequences of this seismic research and does not allow it to proceed, especially since similar testing has already been done in the 1980s by the USGS, according to a published paper from 1980 and a set of digital data on CD-ROM from 1988-89 by the USGS - an Atlas of the U.S. Exclusive Economic Zone, both of which appear to include the same information that this new study is apparently designed to discover. It would seem the USGS doesn't read their own publications. NOAA Fisheries division is engaged in protecting marine life from harm - I would hope you would follow through and do what your service is supposed to do, and shut down this testing and any further seismic airgun testing around the U.S. coastline.

Connie Nunemaker, retired Science teacher
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