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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XD141

Takes of Marine Mammals Incidental to Specified Activities; Marine Geophysical Survey in the Northwest Atlantic Ocean offshore New Jersey, July to August 2014

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) implementing regulations, we hereby give notice that we have issued an Incidental Harassment Authorization (Authorization) to Lamont-Doherty Earth Observatory (Observatory), a component of Columbia University, in collaboration with the National Science Foundation (Foundation), to take marine mammals, by harassment, incidental to conducting a marine geophysical (seismic) survey in the northwest Atlantic Ocean off the New Jersey coast July through August, 2014.

DATES: Effective July 1, 2014, through August 17, 2014.

ADDRESSES: A copy of the final Authorization and application are available by writing to Jolie Harrison, Supervisor, Incidental Take Program, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910, by telephoning the contacts listed here, or by visiting the internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

The Foundation has prepared an Environmental Assessment (EA) and in accordance with the National Environmental Policy Act (NEPA) and the regulations published by the Council on Environmental Quality (CEQ). The EA titled, "Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, June–July 2014," was prepared by LGL, Ltd. environmental research associates, on behalf of the Foundation and the Observatory. We have also prepared an EA titled, "Issuance of an Incidental Harassment Authorization to Lamont Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey in the Northwest Atlantic Ocean, June – August, 2014," and FONSI in accordance with NEPA and NOAA Administrative Order 216-6. To obtain an electronic copy of these documents, write to the previously mentioned address, telephone the contact listed here (see FOR FURTHER INFORMATION CONTACT), or download the files at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

NMFS also issued a Biological Opinion under section 7 of the Endangered Species Act (ESA) to evaluate the effects of the survey and Authorization on marine species listed as threatened and endangered. The Biological Opinion is available online at: http://www.nmfs.noaa.gov/pr/consultations/opinions.htm.

FOR FURTHER INFORMATION CONTACT: Jeannine Cody, NMFS, Office of Protected Resources, NMFS (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.) directs the Secretary of Commerce to allow, upon

request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specific geographic region if, after NMFS provides a notice of a proposed authorization to the public for review and comment: (1) NMFS makes certain findings; and (2) the taking is limited to harassment.

Through the authority delegated by the Secretary, NMFS (hereinafter we) shall grant an Authorization for the incidental taking of small numbers of marine mammals if we find that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The Authorization must also prescribe, where applicable, the permissible methods of taking by harassment pursuant to such activity; other means of effecting the least practicable adverse impact on the species or stock and its habitat, and on the availability of such species or stock for taking for subsistence uses (where applicable); the measures that we determine are necessary to ensure no unmitigable adverse impact on the availability for the species or stock for taking for subsistence purposes (where applicable); and requirements pertaining to the mitigation, monitoring and reporting of such taking. We have defined "negligible impact" in 50 CFR 216.103 as “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

Except with respect to certain activities not pertinent here, the MMPA defines “harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or

(ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Summary of Request

On December 17, 2013, we received an application from the Observatory requesting an Authorization for the take of marine mammals, incidental to conducting a seismic survey in the northwest Atlantic Ocean from June through July, 2014. We determined the application complete and adequate on February 3, 2014 and published a notice of proposed Authorization on March 17, 2014 (79 FR 14779). The notice afforded the public a 30-day comment period on our proposed MMPA Authorization. In response to a request by several environmental organizations and others, we extended the comment period for an additional 30 days. (79 FR 19580, April 9, 2014).

The Observatory, with research funding from the Foundation, plans to conduct a high-energy, 3-dimensional (3-D) seismic survey using the R/V Marcus G. Langseth (Langseth) in the northwest Atlantic Ocean approximately 25 to 85 kilometers (km) (15.5 to 52.8 miles (mi)) off the New Jersey coast for approximately 30 days during the period between July 1, 2014 through August 17, 2014. The proposed activity will generate increased underwater sound during the operation of the seismic airgun arrays. Thus, we anticipate that take, by Level B harassment only, of 27 species of marine mammals could result from the specified activity.

Description of the Specified Activity

Overview

The Observatory plans to use one source vessel, the Langseth, two pairs of seismic airgun subarrays configured with four or eight airguns as the energy source and four hydrophone streamers to conduct the conventional seismic survey. In addition to the airgun operations, the Observatory intends to operate a multibeam echosounder, a sub-bottom profiler, and acoustic Doppler current profiler continuously throughout the survey. However, they would not operate the multibeam echosounder, sub-bottom profiler, and acoustic Doppler current profiler during transits to and from the survey area.

The purpose of the research seismic survey is to collect and analyze data on the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to present. The 3-D survey would investigate features such as river valleys cut into coastal plain sediments now buried under a kilometer of younger sediment and flooded by today's ocean.

Dates and Duration

The Observatory proposes to conduct the research seismic survey from the period of end of June through July 2014. The study (e.g., equipment testing, startup, line changes, repeat coverage of any areas, and equipment recovery) would include approximately 720 hours of airgun operations (i.e., 30 days over 24 hours). Some minor deviation from the Observatory's requested dates is possible, depending on logistics, weather conditions, and the need to repeat some lines if data quality is substandard. Thus, this Authorization will be effective from July 1, 2014 through August 17, 2014.

Specified Geographic Area

The Observatory proposes to conduct the seismic survey in the Atlantic Ocean, approximately 25 to 85 km (15.5 to 52.8 mi) off the coast of New Jersey between approximately 39.3–39.7° N and approximately 73.2–73.8° W (see Figure 1). Water depths in the survey area are approximately 30 to 75 m (98.4 to 246 feet (ft)). They would conduct the proposed survey outside of New Jersey state waters and within the U.S. Exclusive Economic Zone.

Detailed Description of Activities

Transit Activities

During the effective dates of the Authorization, the Langseth would depart from New York and would transit for approximately eight hours to the survey area. Setup, deployment, and streamer ballasting would occur over approximately three days. At the conclusion of the 30-day survey, the Langseth would take approximately one day to retrieve gear and would return to New Jersey.

Vessel Specifications

We outlined the vessel's specifications in the notice of proposed Authorization (79 FR 14779, March 17, 2014). This description is not repeated here as the vessel's specifications have not changed between the proposed Authorization and our final Authorization.

Data Acquisition Activities

We outlined the details regarding the Observatory's data acquisition activities using the airguns, multibeam echosounder, sub-bottom profiler, and acoustic Doppler current profiler in the notice of proposed Authorization (79 FR 14779, March 17, 2014). After

the close of the public comment period, the Observatory informed us that they would not operate the multibeam echosounder, sub-bottom profiler, and acoustic Doppler current profiler during transits to and from the survey area.

Other than this modification, there has been no change to the Observatory's data acquisition activities as described in the proposed Authorization. For a more detailed description of the authorized action, including vessel and acoustic source specifications, metrics, characteristics of airgun pulses, predicted sound levels of airguns, etc., we refer the reader to the notice of proposed Authorization (79 FR 14779, March 17, 2014) and associated documents referenced above this section.

Comments and Responses

We published a notice of receipt of the Observatory's application and proposed Authorization in the Federal Register on March 17, 2014 (79 FR 14779). During the 60-day public comment period, we received comments from two private citizens and the following organizations: the Marine Mammal Commission (Commission); Clean Ocean Action, Oceana, The Ocean Foundation, Center for Biological Diversity, Hands Across the Sand, Save Barnegat Bay, Clean Water Action, CWA Local 1075, and Paddleout.org—collectively known as COA et al.; U.S. Senator Cory A. Booker; New Jersey Beach Buggy Association; Marine Trades Association of New Jersey; Marcus Langseth Science Oversight Committee (MLSOC); and the State of New Jersey Department of Environmental Protection (NJDEP).

In addition, the following organizations submitted a request for a 60-day extension to the public comment period and a public hearing prior to the conclusion of the public comment period. They are: Clean Ocean Action; Oceana, The Ocean Foundation, Natural

Resources Defense Council, Center for Biological Diversity, Alaska Inter-Tribal Council, International Game Fish Association, Cetacean Society International, Whale and Dolphin Action League, Surfrider Foundation, League of Women Voters of New Jersey, American Littoral Society, Hands Across the Sand, New Jersey Sierra Club, Fisherman's Dock Cooperative, Natural Resources Protective Association, Surfer's Environmental Alliance, WATERSPIRIT, SandyHook SeaLife Foundation, Lenape Nation PA, CWA Local 1075, Paddleout.org, reEarth, Clean Water Action, Association of NJ Environmental Commissions, Asbury Park Fishing Club, Save Barnegat Bay, and concerned citizens.

These comments are online at:

http://www.nmfs.noaa.gov/pr/pdfs/permits/nsfldeo_comments2014.pdf.

We address any comments specific to the Observatory's application that address the statutory and regulatory requirements or findings that we must make in order to issue an Authorization. Following is a summary of the public comments and our responses.

Effects Analyses

Comment 1: The Commission expressed concerns regarding the Observatory's use of a ray trace-based model to estimate exclusion and buffer zones and the numbers of takes for NSF-funded geophysical research. They stated that the model is not conservative because it assumes spherical spreading, a constant sound speed, and no bottom interactions instead of incorporating site-specific environmental characteristics (e.g., sound speed profiles, refraction, bathymetry/water depth, sediment properties/bottom loss, or absorption coefficients).

Response: We acknowledge the Commission's concerns about the Observatory's current modeling approach for estimating exclusion and buffer zones and also acknowledge that the Observatory did not incorporate site-specific sound speed profiles, bathymetry, and sediment characteristics of the research area within the current approach to estimate those zones for this Authorization. However, as described below, empirical data collected at two different sites and compared against model predictions indicate that other facets of the model (besides the site-specific factors cited above) do result in a conservative estimate of exposures in the cases tested.

The Observatory's application (LGL, 2013) and Appendix A in the Foundation's EA (NSF, 2014) describe the approach to establishing mitigation exclusion and buffer zones. In summary, the Observatory acquired field measurements for several array configurations at shallow- and deep-water depths during acoustic verification studies conducted in the northern Gulf of Mexico in 2003 (Tolstoy et al., 2004) and in 2007 and 2008 (Tolstoy et al., 2009). Based on the empirical data from those studies, the Observatory developed a sound propagation modeling approach that conservatively predicts received sound levels as a function of distance from a particular airgun array configuration in deep water. In 2010, the Observatory assessed the accuracy of their modeling approach by comparing the sound levels of the field measurements in the Gulf of Mexico study to their model predictions (Diebold et al., 2010). They reported that the observed sound levels from the field measurements fell almost entirely below the predicted mitigation radii curve for deep water (Diebold et al., 2010). Based on this information, the Observatory has shown that their model can reliably estimate mitigation radii in deep water. We acknowledge that the Observatory based their modeling approach

on the environmental variability present in the Gulf of Mexico, but the model has limited ability to capture the variability resulting from site-specific factors present in the marine environment offshore New Jersey. In light of these limitations, we have recommended a more conservative approach to mitigation specifically tailored to this survey and we describe it later in this section.

We note that the Observatory used a similar process to develop mitigation radii (i.e., exclusion and buffer zones) for a shallow-water seismic survey in the northeast Pacific Ocean offshore Washington in 2012. The Observatory conducted the shallow-water survey using an airgun configuration that was approximately 78 or 89 percent larger than the total discharge volumes proposed for this shallow-water survey (i.e., 6,600 cubic inches (in^3) compared to 700 in^3 or 1,400 in^3) and recorded the received sound levels on the shelf and slope off Washington using the Langseth's 8-km hydrophone streamer. Crone et al. (2013) analyzed those received sound levels from the 2012 survey and reported that the actual distances for the exclusion and buffer zones were two to three times smaller than what the Observatory's modeling approach predicted. While the results confirm bathymetry's role in sound propagation, Crone et al. (2013) were able to confirm that the empirical measurements from the Gulf of Mexico calibration survey (the same measurements used to inform the Observatory's modeling approach for this survey in shallow water) overestimated the size of the exclusion and buffer zones for the shallow-water 2012 survey off Washington and were thus precautionary, in that particular case, for effecting the least practicable impact marine mammals. The Observatory presented these preliminary results in a poster session at the American Geophysical Union fall meeting in December 2013 (Crone et al., 2013; available at:

http://berna.ldeo.columbia.edu/agu2013/agu2013.pdf) and they anticipate publishing their final analyses in a peer-reviewed journal publication later this year.

At present, the Observatory cannot adjust their modeling methodology to add the environmental and site-specific parameters as requested by the Commission. We are working with the Foundation to address the issue of requiring site-specific information to further inform the analysis and development of mitigation measures in coastal areas for future surveys with the Observatory and the Foundation, and the Foundation has been exploring different approaches in collaboration with the Observatory and other academic institutions with whom they collaborate. We will continue to work with the Observatory, the Foundation, and the Commission on verifying the accuracy of their modeling approach. When available, we will review and consider the final results from the Observatory's expected publication (Crone et al., in prep.) and how they reflect on the Observatory's model.

For this survey, the Observatory developed the exclusion and buffer zones based on the conservative deep-water calibration results and empirically-derived shallow water exclusion zones from Diebold et al. (2010). The Observatory's current modeling approach represents the best available information to reach our determinations for the Authorization. As described above, the comparisons of the Observatory's model results and the field data collected in the Gulf of Mexico and Washington illustrate a degree of conservativeness built into the Observatory's model for deep water, which would be expected to offset some of the limited ability of the model to capture the variability resulting from site-specific factors, especially in shallow water. However, in support of effecting the least practicable adverse impact, NMFS explored and included a

requirement in this Authorization for the use of an enlarged exclusion zone specifically for this survey, which is expected to further offset the limitations of the model and afford additional protection to marine mammals from potential injury. In our analysis of whether to require additional mitigation, NMFS considers both the expected reduction in impacts to marine mammals that measure(s) are expected to effect, as well as the practicability of the measure for applicant implementation, and in the case of this particular survey, the balance of these factors supported the enlargement of the exclusion zone. For this survey, NMFS will require the Observatory to enlarge the radius of 180-dB and 190-dB exclusion zones for all airgun array configurations by a factor of 50 percent, which results in more than doubling the area within the exclusion zone.

Comment 2: The Commission notes that the Foundation and the U.S. Geological Survey (USGS) previously modeled sound propagation under various environmental conditions in their PEIS. They further state that the Observatory and the Foundation (in cooperation with Pacific Gas and Electric Company) 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 FR 58256, September 19, 2012). The Commission states that these examples indicate that these agencies and other organizations are able to implement the recommended modeling approach, if required by NMFS. The Commission recommends that we should hold the Observatory, the Foundation, and other related agencies to the same standard. The Commission also recommends that we require the Observatory to re-estimate the proposed zones and take estimates using site-specific parameters (including at least sound speed profiles, bathymetry, and sediment characteristics) for the proposed Authorization.

They also recommend that we require the same for all future incidental harassment authorization requests submitted by the Observatory, the Foundation, and other related entities.

Response: There are many different modeling products and services commercially available that applicants could potentially use in developing their take estimates and analyses for MMPA authorizations. These different models range widely in cost, complexity, and the number of specific factors that can be considered in any particular modeling run. NMFS does not, and does not believe that it is appropriate to, prescribe the use of any particular modeling package. Rather, each applicant's approach is evaluated independently in the context of their activity. In cases where simpler models are used and there is concern that a model might not capture the variability across a parameter(s) that is not represented in the model, conservative choices are often made at certain decision points in the model to help ensure that modeled estimates are buffered in a manner that would not result in the agency underestimating the number of takes or extent of effects. In this case, results have shown that the Observatory's model reliably and conservatively estimates mitigation radii in deep water. First, the observed sound levels from the field measurements fell almost entirely below the Observatory's estimated mitigation radii for deep water (Diebold et al., 2010). These conservative mitigation radii are the foundation for the Observatory's shallow water radii used in this survey. Second, the Observatory's analysis of measured shallow water radii during the 2012 survey show that the Observatory's modeled radii for the Washington survey overestimated the measured 160-dB radii by approximately 10 km (6.2 mi) and overestimated the measured 180-dB radii by approximately 500 m (1,640 ft) (Crone et al., 2013). Based on Crone et al.'s (2013)

preliminary findings, we find that the Observatory's shallow-water radii based on the Gulf of Mexico calibration study were larger (i.e., more conservative) for that particular study. Based on these empirical data, which illustrate the model's conservative exposure estimates across two sites, NMFS finds that the Observatory's model effectively estimates sound exposures. However, as described in the response above, for this survey we have increased the 180-dB and 190-db exclusion zone radii for this survey by a factor of 50 percent (equivalent to approximately a 3-dB difference in received level at the zone edge) to be additionally precautionary.

Comment 3: The Commission questioned the Observatory's use of a new correction factor (or a scaling approach) to generate exclusion zones for shallow-water for this proposed survey. They noted that for previous applications, the Observatory applied correction factors (based on the ratio of modeled deep-water radii to modeled shallow water radii reported in Tolstoy et al. (2009)) to derive exclusion zones for shallow-water. The Commission was unsure why the Observatory would assume that calculating a ratio of modeled zones in deep water would be appropriate to equate to empirical zones in shallow water, stating that the two quantities were not comparable.

Response: The Observatory has improved its methodology for deriving shallow-water mitigation zones based on the approach described in Comment 1. To clarify, the Observatory did not model shallow water exclusion zones proposed for this study, but used a scaling approach based upon the conservative deep-water model to derive appropriate scaling factors for shallow water zones. To clarify part of the Commission's comment in short, the Observatory did not equate the zones in deep water to the zones in shallow water (which would not be appropriate, as these could vary greatly compared to

one another based on the environment). Rather, they used the ratio of the size of safety zones of a large airgun in deep water compared to this airgun array in deep water to determine the size of the safety zone for this airgun in shallow water, given the known zone for the same large airgun in shallow water. We believe that this is a rational method for best using the available information to estimate the safety zones.

Following is a brief summary of the Observatory's process used to predict the mitigation exclusion zones (shown in Table A1 of the Foundation's EA) for the survey.

1. For an 18-gun, 3,300-in^3 array towed at a depth of 6 m (19.6 ft), the model predicted that the 160-, 180-, and 190-dB isopleths would result in radii (i.e., exclusion zones) of 4,500, 450, and 142 m (2.8, 0.3, and 0.1 mi) respectively, in deep water (Figure A3 in Appendix A of the Foundation's EA). The empirical data for the airgun configurations indicated that, for deep water, the Observatory's modeling approach overestimated the received sound levels of field measurements at a given distance (Diebold, et al., 2010).

2. Using the direct-arrival modeling approach, the Observatory modeled the exclusion zones for the proposed suite of array configurations for this study in deep water (Figures A4-A8 in Appendix A of the Foundation's EA).

3. The Gulf of Mexico calibration study did not obtain measurements for the smaller array (i.e., 700 in^3 or 1,400 in^3) proposed for use in this survey. To account for this difference, the Observatory developed a scaling factor to extrapolate shallow-water exclusion zones for the proposed study (NSF, 2014).

4. The Observatory calculated the ratios (i.e., scaling factors) between the model's deep-water exclusion zones for the 18-gun, 3,300-in^3 array, and the model's deep-water

exclusion zones for the study's various airgun configurations. This is an appropriate comparison of the sound exposure level outputs between two different types of airgun configurations in deep water.

5. To calculate the exclusion zones for the study's various array configurations in shallow water, the Observatory multiplied the scaling factors by the empirically-derived shallow water exclusion zones reported for an 18-gun, 3,300-in^3 array in the Gulf of Mexico (Diebold, et al., 2010).

Comment 4: The Commission stated that the Observatory's latest modeling approach for predicting the mitigation exclusion zones would reduce the size of the applicable zones used in previous surveys and disagrees with the Observatory's derivation of scaling factors based on the modeled results in deep water.

Response: See our response to Comment 3. The Observatory's new approach compares the sound exposure level (SEL) outputs between two different types of airgun configurations in deep water. This approach is more rigorous than the Observatory's previous approach and allows them to derive scaling relationships between the arrays and extrapolate empirical measurements or model outputs to different array sizes and tow depths. For example, if an Airgun Source A produces sound energy that is three times greater than Airgun Source B in deep water, it is reasonable to infer that the shallow-water mitigation zones for Airgun Source A would be three times larger than the shallow-water mitigation zones for Airgun Source B. The Observatory believes that their new approach of deriving scaling factors is a more rigorous approach to extrapolate existing empirical measurements for shallow water. Because their model does not incorporate environmental parameters, this is the best available information to extrapolate the in situ

shallow water measurements to array sizes and array tow depths without field verification studies (Crone et al., 2013; Crone et. al., in press; Barton and Diebold, 2006). Also, as noted above and specific to this survey, we have enlarged the exclusion zone.

Comment 5: The Commission requests that the Observatory test and verify the use of their model under the specific environmental conditions they would encounter with each survey because the environmental conditions in waters of the continental shelf off New Jersey indicate a surface duct at 50 m (164 ft), in-water refraction, and bathymetry and sediment characteristics that reflect sound (NSF 2011 PEIS, Appendix B, Figure B7). They note that the Observatory did not include these site-specific parameters in their modeling approach.

Response: The Observatory's modeling approach consists of a free-field model that does not have the capability to incorporate fine-resolution environmental variation. The Foundation's 2011 Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (PEIS) (June, 2011) presented several representative survey locations (i.e., detailed analysis areas or DAAs) for sound propagation modeling that incorporated these fine-scale environmental parameters. They modeled a DAA offshore from New Jersey over the Hudson canyon covering an area with depths varying from less than 328 ft (100 m) to greater than 4,920 ft (1,500 m). Although the PEIS included modeling for the northwest Atlantic DAA, the Foundation's model was for a different energy source and survey parameters (e.g. survey water depths and source tow depth) than what the Observatory proposed for the current survey. Thus, the Foundation prepared a site-specific EA to account for the different

energy source and airgun configurations for the survey and used the Observatory's model which does not consider other attenuation mechanisms such as low-frequency cutoff and absorption.

With respect to the 50-m (164 ft) surface duct identified in the Foundation's PEIS, the Observatory identified the potential surface duct feature in its modeling effort, but concluded the feature was not applicable for this survey because the activities would occur in waters less than 50 m (164 ft). For the reasons described below, NMFS concurs with the Foundation's assessment that the presence of such a surface duct would have little effect on the exposure estimates for this survey.

In light of this information, we considered that the water column in the survey area is a mixed layer with no surface duct. Although the existence of a surface duct could enhance sound propagation due to acoustic energy trapped within this narrow channel, the condition for such propagation is highly dependent on frequency (or wavelength) of the propagating sound. The acoustic waves moving through the sound channel are typically those with shorter wavelength (i.e., higher frequency) in relation to the depth of the channel or water column.

An equation by Jensen et al., (2011) shows that the relationship between the propagating wave and medium thickness of the duct: $F_0 \cong 1500 / 0.008\ D^{3/2}$, where F_0 is the minimum frequency (or cutoff frequency) in Hz of the acoustic wave being able to effectively propagate through the duct or water column, and D is the thickness in meters of the surface duct. As the equation indicates, the surface duct ceases to trap energy when the wavelength of the sound becomes too large or frequency becomes too low.

In the case of Observatory's activity, the majority of the source energy is within the first two lobes below 333 Hz, with only a fraction of acoustic energy that lies within the remaining third and fourth lobes (330 – 667 Hz). Based on the above equation, thickness of the duct required for effective propagation of the sound wave first two lobes would be 68.6 m (225 ft). Although acoustic energy within the third and fourth lobes would be trapped in the surface duct and propagated to greater distances, they represent only a fraction of the total acoustic energy for this survey.

Comment 6: The Commission discussed the outcomes of a March 2013 meeting with the Observatory and the Foundation where Observatory staff indicated the possibility of comparing their model to the hydrophone field measurements collected during previous surveys in environmental conditions other than those in the Gulf of Mexico (i.e., deep and intermediate waters in cold water environments that may have surface ducting conditions, shallow-water environments, etc.). The Commission understands that the Observatory is analyzing hydrophone data with field measurements from waters off Washington to compare to the estimated exclusion and buffer zones, but questioned why they did not use that method for the current proposed authorization. The Commission recommended in a June 24, 2013 letter that the Observatory should make those comparisons prior to the submittal of applications for geophysical surveys conducted in 2014.

Response: We refer the Commission to our responses to Comments 1 and 3 discussing their approach to developing mitigation zones and their analyses of hydrophone data collected for the 2012 Washington survey. Results indicated that the Observatory's shallow-water radii based on the Gulf of Mexico calibration study are

larger (i.e., more conservative) compared to the smaller empirical distances measured by Crone et al. (2013) for the Washington survey area.

We are currently working with the Foundation to address the issue of including site-specific parameters to account for environmental variation in coastal areas for future surveys. Work is ongoing in exploring approaches for including this information in future surveys conducted in coastal areas and we will consult with the Commission on these activities before the next survey.

Comment 7: The Commission acknowledges that the Observatory calculated take for marine mammals by multiplying the total ensonified area of 2,502 km^2 (which includes a 25 percent contingency) by the applicable densities for marine mammals in the survey area. However, they state that the Observatory should determine the total ensonified area within a given day and then multiply that factor by the number of survey days (30) and the applicable densities because the survey consists of 4,900 km of tracklines (spaced 150 m [490 ft] apart) in an area of 12 by 50 km (7.4 by 31 miles). They contend that the Observatory's current method underestimates the number of marine mammals potentially taken and recommend that we require the Observatory to estimate the numbers of marine mammals potentially taken based on the total ensonified area in any given day, multiplied by 30 days, and the applicable densities.

Response: The Observatory modeled the number of different individuals that could be exposed to airgun sounds with received levels greater than or equal to 160 dB re: 1 µPa on one or more occasions by multiplying the total marine area that would be within the 160-dB radius around the operating seismic source on at least one occasion (2,502 km^2 which includes a 25 percent contingency factor to account for repeated tracklines), along

with the expected density of animals in the area. The Observatory acknowledged in their application that this approach does not allow for turnover in the mammal populations in the area during the course of the survey as the actual number of individuals exposed may be underestimated because it does not account for new animals entering or passing through the ensonification area (NSF, 2014), however, the Observatory suggested that the 25 percent contingency factor would cover any potential underestimate of individuals.

The Observatory also considered the likelihood of re-exposure during the survey in the Foundation's EA by estimating the ratio of the ensonified area including overlap (76,645.61 km^2) and the ensonified area excluding overlap (2001.91 km^2). The area including overlap is 38.3 times greater than the area excluding overlap and 30.6 times greater than the area excluding overlap including the 25 percent contingency (i.e., 2,502.4 km^2). Thus, a marine mammal that stayed within the survey area during the entire survey could potentially experience re-exposure up to 38 times. However, it is unlikely that a particular animal would remain in the area during the entire survey (Bain and Williams, 2006; MacLeod et al., 2006; McCauley et al., 2000; McDonald et al., 1995).

The Observatory references a 25 percent contingency factor added onto its take estimates, however, this buffer is also intended to cover marine mammal takes that could potentially result from the operational adjustments, such as the need to rerun survey lines (though in practice, the Observatory has rarely, if ever, utilized this contingency). However, NMFS finds it more appropriate to incorporate a mechanism to explicitly account for the potential of positive immigration of marine mammals into the survey area that the Commission references, and therefore we have included a generalized species-related turnover estimate for the reported densities to account for the potential of new

animals entering or passing through the ensonified area. Use of a turnover factor recognizes some of the limitations of the Observatory using a static density estimate for this survey. Thus we are using a generalized turnover estimate of 1.25 (Wood et al., 2012) as a correction factor for the marine mammal densities presented in Table 4. In some cases, a larger turnover rate might be appropriate for migratory species, however, the likelihood of encountering these species is very low for this area and conservative choices have already been made in the estimate of take for mysticetes and sperm whales.

The method recommended by the Commission is a way to help understand the instances of exposure above the Level B threshold, however, that method would far overestimate the number of individual marine mammals exposed above the threshold, as turnover within the project are does not nearly approach 100 percent per day. The new 1.25 turnover rate will help better estimate the number of animals exposed, and the method described earlier in this response helps indicate the likely maximum number of instances per individual (though in many instances there will be fewer exposures).

Comment 8: The New Jersey Beach Buggy Association (NJBBA) states that "Even though surveys have been made off the coasts of Australia (the Northern Carnarvon Bain, Australian Northwest Shelf) and the Gulf of Mexico, no references have been given or found concerning the before and after observations on mammals, fish, and plant life that cannot avoid the repercussions from the impact of the sound waves."

Response: We disagree with the commenter's assertion that no references exist concerning before and after observations on marine life in the vicinity of seismic surveys. We refer the commenter to the Observatory's application, the Foundation's EA, and the notice of the proposed Authorization (79 FR 14779, March 17, 2014) which collectively

provided information on the anticipated effects of airgun sounds on marine mammals, fish, and invertebrates.

Comment 9: The NJBBA commented on the 2006 Sperm Whale Seismic Study in the Gulf of Mexico stating that one of the report's recommendations called for a delay of the actual seismic testing for a number of years to allow for further data acquisition under controlled conditions of its effect on mammals, fish, and plant life.

Response: We considered the results of the Jochens et al. (2008) study in our notice of the proposed Authorization (79 FR 14779, March 17, 2014) and the Foundation considered the same information in their 2011 PEIS. We note that sections 1.4 and 1.5 of the Jochens et al. (2008) report summarize six major conclusions and recommendations, none of which call for delays in seismic testing to allow for further data acquisition under controlled conditions. On the contrary, they recommend the extension of controlled exposure experiment work on marine mammals (Jochens et al., 2008; Recommendation 3, page 15).

Comment 10: NJBBA noted that a recent review presented information on the impacts of seismic airgun surveys on fish, marine mammals, and invertebrates (Wielgart, 2014). They expressed concerns on the survey's impact on the ecological system including bivalves, economic impacts, and the future loss of fisheries.

Response: We considered the information provided in Wielgart (2014) in making our final determinations. The review, titled "A Review of the Impacts of Seismic Airgun Surveys on Marine Life" presents a synopsis of impacts on marine mammals, marine turtles, fish, and invertebrates that we considered in the Observatory's application, the Foundation's EA, and our notice of the proposed Authorization (79 FR 14779, March 17,

2014). The Foundation's draft EA at http://www.nsf.gov/geo/oce/envcomp/mountain-draftea-201317dec.pdf also assessed the survey's impacts on commercial and recreational fisheries.

Comment 11: The Marine Trades Association of New Jersey requested the cancellation of the survey citing potential negative impacts to the recreational fishing communities and other industries. Noting concerns for migrating fish stocks and the local fishing industry, they requested that we require the Observatory to conduct the survey at an alternate time, specifically, January and February to minimize impacts to the marine industry, coastal fish, and marine mammals. Similarly, COA et al. also requested that the Observatory not conduct the survey during the summer months and that we consider alternate survey times to avoid times of peak marine mammal activity.

Finally, the NJDEP also submitted comments expressing concern for not only to marine mammals' food source, but also for the potential impacts to New Jersey's marine mammal boat tour operators and the recreational and commercial fishing industry.

Response: Section 101(a)(5)(D) of the MMPA and its implementing regulations establish a framework for us to determine whether and how we can authorize take incidental to the activities described in the Observatory's application. We do not have the authority to cancel the Observatory's research seismic activities under Section 101(a)(5)(D) of the MMPA, as that authority lies with the Foundation. However, we may add or modify mitigation to ensure the least practicable adverse impacts on marine mammals, and we have done so here.

Regarding the survey's impacts on commercial and recreational fishing, we refer you to the Foundation's (sponsor of the research seismic survey) EA for this survey (Sections

III and IV) which includes consideration of the effects of sound on marine invertebrates, fish, and fisheries and the effects of the survey on the recreational and commercial fishing sectors in New Jersey. The Foundation also completed an ESA Section 7 consultation to address the effects of the research seismic survey on ESA-listed fish species and designated critical habitat within the proposed area as well as a consultation under the Magnuson–Stevens Fishery Conservation and Management Act for essential fish habitat. Finally, the Foundation will address the survey's impacts to the marine mammal boat tour industry in their final EA.

We considered, as one potential MMPA measure, that the Observatory modify its survey schedule to January/February. However, this could result in an increase in the number of takes of North Atlantic right whales due to their increased presence off New Jersey in the fall and winter. Whitt et al. (2013) concluded that right whales were not present in large numbers off New Jersey during the summer months (Jun 22 – Sep 27) which corresponds to the effective dates of the seismic survey (Jun 30 – Aug 17). In contrast, peak acoustic detections for North Atlantic right whales occurred in the winter (Dec 18 – Apr 9) and in the spring (Apr 10– Jun 21) (Whitt, et al., 2013).

We also considered the effects of the survey on marine mammal prey (i.e., fish and invertebrates), as a component of marine mammal habitat, in the notice of the proposed Authorization. Studies have shown both decreases and increases in fisheries catch rates and behavioral changes in captive marine fish and squid during exposure to seismic sound (Lokkeborg et al., 2012; Fewtrell and McCauley, 2012). We acknowledge that disturbance of prey species has the potential to adversely affect marine mammals while foraging. However, given the limited spatio-temporal scale of the survey, the survey

would ensonify only a small fraction of available habitat at any one time because the vessel is continually moving during data acquisition. We would expect prey species to return to their pre-exposure behavior once seismic firing ceased (Lokkeborg et al., 2012; Fewtrell and McCauley, 2012). Although there is a potential for injury to fish or marine life in close proximity to the vessel, we expect that prey responses would have temporary effects on a marine mammal's ability to forage in the immediate survey area. However, we don't expect that temporary reductions in feeding ability would reduce an individual animal's overall feeding success.

Laboratory studies have observed permanent damage to sensory epithelia for captive fish exposed at close range to a sound source (McCauley et al., 2003) and abnormalities in larval scallops after exposure to low frequency noise in tanks (de Soto et al., 2013); however, wild fish are likely to move away from a seismic source (Fewtrell and McCauley, 2012). Finally, other studies provide examples of no fish mortality upon exposure to seismic sources (e.g., Popper et al., 2005; Boeger et al., 2006).

In summary, in examining impacts to fish as prey species for marine mammals, we expect fish to exhibit a range of behaviors including no reaction or habituation (Pena et al., 2013) to startle responses and/or avoidance (Fewtrell and McCauley, 2012). We expect that the seismic survey would have no more than a temporary and minimal adverse effect on any fish or invertebrate species that serve as prey species for marine mammals, and therefore consider the potential impacts to marine mammal habitat minimal as well.

Comment 12: Both the NJDEP and COA et al. expressed concerns related to the survey's impact on the local (coastal) bottlenose dolphin population. They include:

cumulative adverse impacts of the survey in light of the ongoing Unusual Mortality Event (UME); potential increases in marine mammal strandings due to the use of the multibeam echosounder; the survey's temporal overlap with the bottlenose dolphin calving period; and the potential heightened sensitivity of bottlenose dolphin calves to anthropogenic noise.

Response: In 2013, NMFS declared a UME for elevated bottlenose dolphin strandings along the Atlantic coast (New York through Florida). From July 1, 2013 – June 8, 2014, there have been 1,325 strandings from New York to Florida. Of those strandings, 140 dolphins have stranded in New Jersey, which is significantly higher than the average annual bottlenose dolphin stranding rate of 10 strandings (based on 2007-2012 data). In New Jersey, 46 of 50 stranded bottlenose dolphins sampled tested positive for morbillivirus (92 percent) and one grey seal was suspect positive for canine distemper virus (a closely related species).

We expect that the survey's activities would result, at worst, in a temporary modification in behavior, temporary changes in animal distribution, and/or low-level physiological effects (Level B harassment) of bottlenose dolphins. We expect these impacts to be minor because we do not anticipate measurable changes to the population or impacts to rookeries, mating grounds, and other areas of similar significance.

The Authorization outlines reporting measures and response protocols with the Northeast Regional Stranding Coordinator intended to minimize the impacts of, and enhance the analysis of, any potential stranding in the survey area. The Observatory's activities are approximately 20 km (12 mi) away from the habitat in which the coastal bottlenose dolphins the commenter expressed concern are expected to occur (Toth et al.,

2011; 2012), which means that the area is not expected to be ensonified above 160 dB and that take of calves of this stock is not anticipated. Additionally, airgun pulses are outside of the range of frequencies in which dolphin hearing is most sensitive, and Schlundt et al.'s (2013) study suggests that the low-frequency content of air gun impulses may have fewer predicted impacts on bottlenose dolphins. Last, we do not have specific information related to how the acoustic stressors may or may not exacerbate the effects of the ongoing UME with bottlenose dolphins. However, based on the fact that the acoustic effects are expected to be limited to behavioral harassment, and the survey is constantly moving (predominantly far offshore and well away from coastal species and the associated calving areas), we do not anticipate any focused adverse effects to animals involved in the UME.

Regarding COA et al.'s concerns about increased strandings, we note that the Observatory has not experienced a stranding event associated with previous activities conducted in the same general vicinity. The Foundation's EA (NSF, 2014) acknowledges that scientists have conducted numerous 2-D seismic surveys in the general vicinity of the proposed survey from 1979 to 2002. The previous surveys used different airgun array configurations (e.g., a 6-airgun, 1,350-in^3 array in 1990; a single, 45-in^3 GI Gun in 1996 and 1998; and two 45-in^3 GI Guns in 2002). The researchers did not observe any seismic sound-related marine mammal related injuries or mortality, or impacts to fish during these past seismic surveys in the proposed survey area (NSF, 2014; G. Mountain, Pers. Comm.). In the past decade of seismic surveys conducted carried out by the Langseth, protected species observers and other crew members have neither observed nor reported any seismic-related marine mammal injuries or mortalities.

We have considered the potential for behavioral responses such as stranding and indirect injury or mortality from the Observatory's use of the multibeam echosounder. In 2013, an International Scientific Review Panel (ISRP) investigated a 2008 mass stranding of approximately 100 melon-headed whales in a Madagascar lagoon system (Southall et al., 2013) associated with the use of a high-frequency mapping system. The report indicated that the use of a 12-kHz multibeam echosounder was the most plausible and likely initial behavioral trigger of the mass stranding event. This was the first time that a relatively high-frequency mapping sonar system had been associated with a stranding event. However, the report also notes that there were several site- and situation-specific secondary factors that may have contributed to the avoidance responses that lead to the eventual entrapment and mortality of the whales within the Loza Lagoon system (e.g., the survey vessel transiting in a north-south direction on the shelf break parallel to the shore may have trapped the animals between the sound source and the shore driving them towards the Loza Lagoon). They concluded that for odontocete cetaceans that hear well in the 10-50 kHz range, where ambient noise is typically quite low, high-power active sonars operating in this range may be more easily audible and have potential effects over larger areas than low frequency systems that have more typically been considered in terms of anthropogenic noise impacts (Southall, et al., 2013). However, the risk may be very low given the extensive use of these systems worldwide on a daily basis and the lack of direct evidence of such responses previously reported (Southall, et al., 2013).

Given that the Observatory proposes to conduct the survey offshore and the Langseth is not conducting the survey parallel to any coastline, we do not anticipate that the use of the source during the seismic survey would entrap marine mammals between the vessel's

sound sources and the New Jersey coastline. In addition, the Authorization outlines reporting measures and response protocols intended to minimize the impacts of, and enhance the analysis of, any potential stranding in the survey area.

With respect to COA et al.'s concerns about the survey's temporal overlap with the bottlenose dolphin calving period, we note that the Observatory's study area is approximately 20 km (12 mi) away from the identified habitats for coastal bottlenose dolphins and their calves in Toth et al. (2011, 2012) thereby reducing further the likelihood of causing an effect on this species or stock.

In response to COA et al.'s concerns that dolphin calves may be limited in their ability to flee the ensonified area due to their dependence on their mothers and small size, we considered several studies which note that seismic operators and protected species observers regularly see dolphins and other small toothed whales near operating airgun arrays, but in general there is a tendency for most delphinids to show some avoidance of operating seismic vessels (e.g., Moulton and Miller, 2005; Holst et al., 2006; Stone and Tasker, 2006; Weir, 2008; Richardson et al., 2009; Barkaszi et al., 2009; Moulton and Holst, 2010). Also, some dolphins seem to be attracted to the seismic vessel and floats, and some ride the bow wave of the seismic vessel even when large arrays of airguns are firing (e.g., Moulton and Miller, 2005). Nonetheless, small toothed whales more often tend to head away, or to maintain a somewhat greater distance from the vessel, when a large array of airguns is operating than when it is silent (e.g., Stone and Tasker, 2006; Weir, 2008, Barry et al., 2010; Moulton and Holst, 2010). We note that in most cases, the avoidance radii for delphinids appear to be small, on the order of one km or less, and some individuals show no apparent avoidance. In considering the potential heightened

sensitivity of neonate dolphins to noise, Schlundt et al. (2013) suggest that the potential for airguns to cause hearing loss in dolphins is lower than previously predicted, perhaps as a result of the low-frequency content of air gun impulses compared to the high-frequency hearing ability of dolphins.

We do not expect marine mammals to experience any repeated exposures at very close distances to the sound source because the Observatory would implement the required shutdown and power down mitigation measures to ensure that marine mammals do not approach the applicable exclusion zones for Level A harassment. In addition, we anticipate that the required ramp-up procedures at the start of the survey or anytime after a shutdown of the entire array would "warn" marine mammals in the vicinity of the airguns, and provide the time for them to leave the area and thus avoid any potential injury or impairment of their hearing abilities.

Comment 13: COA et al. states that we did not present species information for North Atlantic right whales in our analyses, including the Whitt et al. (2013) peer-reviewed study demonstrating North Atlantic right whale presence off the New Jersey coast year-round, particularly in the spring and summer months.

Response: NMFS disagrees. Table 1 in our notice of proposed authorization (79 FR 14784, March 17, 2014) specifically states that we base the year-round seasonal presence of North Atlantic right whales on the Whitt et al. (2013) paper. Whitt et al. (2013) conducted acoustic and visual surveys for North Atlantic right whales off the coast of New Jersey from January 2008 to December 2009 and observed one sighting of a cow-calf pair in May 2008, but no other sightings of cow-calf pairs throughout the remainder of the study. We considered this information (also presented on page 15 of NSF's draft

EA) and concluded that it was appropriate to increase the Observatory's original request for incidental take related to North Atlantic right whales from zero to three (3) to be conservative in estimating potential take for cow/calf pairs. This adjustment is based on sighting information from two sources (Palka, 2012 and Whitt et al., 2013) which reported the presence of one North Atlantic right whale and one cow/calf pair in the area, respectively.

Monitoring and Reporting

Comment 14: The Commission has indicated that monitoring and reporting requirements should provide a reasonably accurate assessment of the types of taking and the numbers of animals taken by the proposed activity. They state that "…the assessments should 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." They further state that "those adjustments are essential for making accurate estimates of the numbers of marine mammals taken during surveys." The Commission recommends that we consult with the funding agency (i.e., the Foundation) and individual applicants (e.g., the Observatory and other related entities) 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, accounting for applicable g(0) and f(0) values. The Commission recommends that we consult with them prior to finalizing the recommendations.

Response: NMFS' 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. Scientists use g(0) and f(0) values in systematic marine mammal surveys to account for the undetected animals indicated above, however, these values are not simply established and the g(0) value varies across every observer based on their sighting acumen. While we want to be clear that we do 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 Foundation and Observatory's monitoring plan, we agree 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. We are continuing to examine this issue with the Foundation to develop ways to improve their post-survey take estimates. We will consult with the Commission and NMFS scientists prior to finalizing these recommendations.

We note that current monitoring measures for past and current Authorizations for research seismic surveys require the collection of visual observation data by protected species observers prior to, during, and after airgun operations. This data collection may contribute to baseline data on marine mammals (presence/absence) and provide some generalized support for estimated take numbers (as well as providing data regarding behavioral responses to seismic operation that are observable at the surface). However, it is unlikely that the information gathered from these cruises alone would result in any statistically robust conclusions for any particular species because of the small number of animals typically observed.

MMPA Concerns

Comment 15: COA et al. state that NMFS must ensure that the Authorization complies with the MMPA and requests that NMFS deny the Authorization based on their opinion that the potential impacts to marine mammals are incompatible with the prohibitions of the MMPA and that the take would be more than negligible.

Response: We disagree with the commenters' assessment. The MMPA directs us to allow, upon request, the incidental taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity within a specific geographic region if we make certain findings. The legal requirements and underlying analysis for an Authorization per section 101(a)(5)(D) of the MMPA require us to determine that the taking by harassment of marine mammal species or stocks will have a negligible impact on affected species or stocks and will not have an unmitigable adverse impact on the availability of affected species or stocks for taking for subsistence uses. As mentioned in the notice for the proposed authorization (79 FR 14779, March 17, 2014), we expect that the Observatory's activities would result in take by Level B harassment in the form behavioral modifications during the period of the Observatory's active seismic operations. We also expect that the required mitigation and monitoring measures (described in the notice for the proposed Authorization (79 FR 14779, March 17, 2014), and included within the final Authorization) would reduce potential disturbance to marine mammals to the lowest level practicable. We do not anticipate that these behavioral effects would have significant impacts to individual fitness or the population and there are no relevant subsistence uses of marine mammals implicated by this action.

Based on the analysis of the likely effects of the specified activity on marine mammals and their habitat contained within this document, the Foundation's EA and our own EA, and taking into consideration the implementation of the mitigation and monitoring measures, we find that the Observatory's proposed activity would result in the take small numbers of marine mammals relative to the populations of the affected species or stocks, would have a negligible impact on the affected species or stocks, and would not result in an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses as no subsistence users would be affected by the proposed action.

Acoustic Thresholds

Comment 16: COA et al. state that the current NMFS 160-decibel (dB) re: 1 μPa threshold for Level B harassment does not reflect the best available science and is not sufficiently conservative.

Response: Our practice has been to apply the 160 dB re: 1 μPa received level threshold for underwater impulse sound levels to determine whether take by Level B harassment occurs. Specifically, we derived the 160 dB threshold data from mother-calf pairs of migrating gray whales (Malme et al., 1983, 1984) and bowhead whales (Richardson et al., 1985, 1986) responding to seismic airguns. We acknowledge there is more recent information bearing on behavioral reactions to seismic airguns, but those data only illustrate how complex and context-dependent the relationship is between the two, and do not, as a whole, invalidate the current threshold.

However, we discuss the science on this issue qualitatively in our analysis of potential effects to marine mammals (79 FR 14779, March 17, 2014). Accordingly, it is not a

matter of merely replacing the existing threshold with a new one. NMFS is currently developing revised acoustic guidelines for assessing the effects of anthropogenic sound on marine mammals. Until NMFS finalizes these guidelines (a process that includes internal agency review, public notice and comment, and peer review), we will continue to rely on the existing criteria for Level A and Level B harassment shown in Table 4 of the notice for the proposed authorization (79 FR 14779, March 17, 2014).

As mentioned in the Federal Register notice for the proposed authorization (79 FR 14779, March 17, 2014), we expect that the onset for behavioral harassment is largely context dependent (e.g., behavioral state of the animals, distance from the sound source, etc.) when evaluating behavioral responses of marine mammals to acoustic sources. Although using a uniform sound pressure level of 160-dB re: 1 μPa for the onset of behavioral harassment for impulse noises may not capture all of the nuances of different marine mammal reactions to sound, it is an appropriate way to manage and regulate anthropogenic noise impacts on marine mammals until NMFS finalizes its acoustic guidelines.

Comment 17: COA et al. requested that we use a behavioral threshold below 160 dB for estimating take based on results reported in Clark and Gagnon (2006), MacLeod et al. (2006), Risch et al. (2012), McCauley et al. (1998), McDonald et al. (1995), Bain and Williams (2006), DeRuiter et al. (2013). They also cite comments submitted by Clark et al. (2012) on the Arctic Ocean Draft Environmental Impact Statement regarding NMFS' current acoustic thresholds.

Response: NMFS is constantly evaluating new science and how to best incorporate it into our decisions. This process involves careful consideration of new data and how it is

best interpreted within the context of a given management framework. Each of these articles emphasizes the importance of context (e.g., behavioral state of the animals, distance from the sound source, etc.) in evaluating behavioral responses of marine mammals to acoustic sources.

These papers and the studies discussed in our notice of proposed authorization (79 FR 14779, March 17, 2014) note that there is variability in the behavioral responses of marine mammals to noise exposure. However, it is important to consider the context in predicting and observing the level and type of behavioral response to anthropogenic signals (Ellison et al., 2012). There are many studies showing that marine mammals do not show behavioral responses when exposed to multiple pulses at received levels at or above 160 dB re: 1 μPa (e.g., Malme et al., 1983; Malme et al., 1984; Richardson et al., 1986; Akamatsu et al., 1993; Madsen and Mohl, 2000; Harris et al., 2001; Miller et al., 2005; and Wier, 2008). And other studies show that whales continue important behaviors in the presence of seismic pulses (e.g., Richardson et al., 1986; McDonald et al., 1995; Greene et al., 1999a, 1999b; Nieukirk et al., 2004; Smultea et al., 2004; Holst et al., 2005, 2006; Dunn and Hernandez, 2009).

In a passive acoustic research program that mapped the soundscape in the North Atlantic Ocean, Clark and Gagnon (2006) reported that some fin whales (Balaenoptera physalus) stopped singing for an extended period starting soon after the onset of a seismic survey in the area. The study did not provide information on received levels or distance from the sound source. The authors could not determine whether or not the whales left the area ensonified by the survey, but the evidence suggests that most if not all singers remained in the area (Clark and Gagnon, 2006). Support for this statement comes from

the fact that when the survey stopped temporarily, the whales resumed singing within a few hours and the number of singers increased with time (Clark and Gagnon, 2006). Also, they observed that one whale continued to sing while the seismic survey was actively operating (Figure 4; Clark and Gagnon, 2006).

The authors conclude that there is not enough scientific knowledge to adequately evaluate whether or not these effects on singing or mating behaviors are significant or would alter survivorship or reproductive success (Clark and Gagnon, 2006). Thus, to address COA et al.'s concerns related to the results of this study, it is important to note that the Observatory's study area is well away from any known breeding/calving grounds for low frequency cetaceans and approximately 20 km (12 mi) away from the identified habitats for coastal bottlenose dolphins and their calves in Toth et al. (2011, 2012) thereby reducing further the likelihood of causing an effect on marine mammals.

MacLeod et al. (2006) discussed the possible displacement of fin and sei whales related to distribution patterns of the species during a large-scale seismic survey offshore the west coast of Scotland in 1998. The authors hypothesized about the relationship between the whale's absence and the concurrent seismic activity, but could not rule out other contributing factors (Macleod, et al., 2006; Parsons et al., 2009). We would expect that marine mammals may briefly respond to underwater sound produced by the seismic survey by slightly changing their behavior or relocating a short distance. Based on the best available information, we expect short-term disturbance reactions that are confined to relatively small distances and durations (Thompson et al., 1998; Thompson et al., 2013), with no long-term effects on recruitment or survival.

Regarding the suggestion that blue whales "significantly" changed course during the conduct of a seismic survey offshore Oregon, we disagree. We considered the McDonald et al. (1995) paper in the notice for the proposed authorization (79 FR 14779, March 17, 2014). In brief, the study tracked three blue whales relative to a seismic survey with a 1,600 in3 airgun array (slightly higher than the Observatory's 1,400 in^3 airgun array). The whale started its call sequence within 15 km (9.3 mi) from the source, then followed a pursuit track that decreased its distance to the vessel where it stopped calling at a range of 10 km (6.2 mi) (estimated received level at 143 dB re: 1 μPa (peak-to-peak) (McDonald et al., 1995). After that point, the ship increased its distance from the whale which continued a new call sequence after approximately one hour (McDonald et al., 1995) and 10 km (6.2 mi) from the ship. The authors suggested that the whale had taken a track paralleling the ship during the cessation phase but observed the whale moving diagonally away from the ship after approximately 30 minutes continuing to vocalize (McDonald et al., 1995). The authors also suggest that the whale may have approached the ship intentionally or perhaps was unaffected by the airguns. They concluded that there was insufficient data to infer conclusions from their study related to blue whale responses (McDonald et al., 1995).

Risch et al. (2012) documented reductions in humpback whale (Megaptera novaeangliae) vocalizations in the Stellwagen Bank National Marine Sanctuary concurrent with transmissions of the Ocean Acoustic Waveguide Remote Sensing (OAWRS) low-frequency fish sensor system at distances of 200 kilometers (km) from the source. The recorded OAWRS produced series of frequency modulated pulses and the signal received levels ranged from 88 to 110 dB re: 1 μPa (Risch et al., 2012). The

authors hypothesize that individuals did not leave the area but instead ceased singing and noted that the duration and frequency range of the OAWRS signals (a novel sound to the whales) were similar to those of natural humpback whale song components used during mating (Risch et al., 2012). Thus, the novelty of the sound to humpback whales in the study area provided a compelling contextual probability for the observed effects (Risch et al., 2012). However, the authors did not state or imply that these changes had long-term effects on individual animals or populations (Risch et al., 2012), nor did they necessarily rise to the level of an MMPA take. Thus, to address COA et al.'s concerns related to the results of this study, we again note that the Observatory's study area is well away from any known breeding/calving grounds for low frequency cetaceans and approximately 20 km (12 mi) away from the identified habitats for bottlenose dolphins and their calves in Toth et al. (2011, 2012) thereby reducing further the likelihood of causing an effect on marine mammals.

We considered the McCauley et al. (1998) paper (along with McCauley et al., 2000) in the notice of proposed authorization (79 FR 14779, March 17, 2014). Briefly, McCauley et al. (1998, 2000) studied the responses of migrating humpback whales off western Australia to a full-scale seismic survey with a 16-airgun array (2,678 in^3) and to playbacks using a single, 20-in^3airgun. Both studies point to a contextual variability in the behavioral responses of marine mammals to sound exposure. The mean received level for initial avoidance of an approaching airgun was 140 dB re: 1 μPa for resting humpback whale pods containing females. In contrast, some individual humpback whales, mainly males, approached within distances of 100 to 400 m (328 to 1,312 ft), where sound levels were 179 dB re: 1 μPa (McCauley et al., 2000). The authors hypothesized that the males

gravitated towards the single operating airgun possibly due to its similarity to the sound produced by humpback whales breaching (McCauley et al., 2000). Despite the evidence that some humpback whales exhibited localized avoidance reactions at received levels below 160 dB re: 1 μPa, the authors found no evidence of any gross changes in migration routes, such as inshore/offshore displacement during seismic operations (McCauley et al., 1998, 2000).

With repeated exposure to sound, many marine mammals may habituate to the sound at least partially (Richardson & Wursig, 1997). Bain and Williams (2006) examined the effects of a large airgun array (maximum total discharge volume of 1,100 in^3) on six species in shallow waters off British Columbia and Washington: harbor seal, California sea lion (Zalophus californianus), Steller sea lion (Eumetopias jubatus), gray whale (Eschrichtius robustus), Dall's porpoise (Phocoenoides dalli), and the harbor porpoise. Harbor porpoises showed "apparent avoidance response" at received levels less than 145 dB re: 1 μPa at a distance of greater than 70 km (43 miles) from the seismic source (Bain and Williams, 2006). However, the tendency for greater responsiveness by harbor porpoise is consistent with their relative responsiveness to boat traffic and some other acoustic sources (Richardson et al. 1995; Southall et al., 2007). In contrast, the authors reported that gray whales seemed to tolerate exposures to sound up to approximately 170 dB re: 1 μPa (Bain and Williams, 2006) and Dall's porpoises (Phocoenoides dalli) occupied and tolerated areas receiving exposures of 170–180 dB re: 1 μPa (Bain and Williams, 2006; Parsons et al., 2009). The authors observed several gray whales that moved away from the airguns toward deeper water where sound levels were higher due to propagation effects resulting in higher noise exposures (Bain and Williams, 2006).

However, it is unclear whether their movements reflected a response to the sounds (Bain and Williams, 2006). Thus, the authors surmised that the gray whale data (i.e., voluntarily moving to areas where they are exposed to higher sound levels) are ambiguous at best because one expects the species to be the most sensitive to the low-frequency sound emanating from the airguns (Bain and Williams, 2006).

DeRuiter et al. (2013) recently observed that beaked whales (considered a particularly sensitive species to sound) exposed to playbacks (i.e., simulated) of U.S. tactical mid-frequency sonar from 89 to 127 dB re: 1 μPa at close distances responded notably by altering their dive patterns. In contrast, individuals showed no behavioral responses when exposed to similar received levels from actual U.S. tactical mid-frequency sonar operated at much further distances (DeRuiter et al., 2013). As noted earlier, one must consider the importance of context (for example, the distance of a sound source from the animal) in predicting behavioral responses.

Regarding the public comments submitted by Clark et al. (2012) in reference to our use of the current acoustic exposure criteria; please refer to our earlier response to COA et al.

None of these studies on the effects of airgun noise on marine mammals point to any associated mortalities, strandings, or permanent abandonment of habitat by marine mammals. Bain and Williams (2006) specifically conclude that "…although behavioral changes were observed, the precautions utilized in the SHIPS survey did not result in any detectable marine mammal mortalities during the survey, nor were any reported subsequently by the regional marine mammal stranding network..." McCauley et al. (2000) concluded that any risk factors associated with their seismic survey "…lasted for a

comparatively short period and resulted in only small range displacement…" Further, the total discharge volume of the airgun arrays cited in McCauley et al., 1998, 2000; Bain and Williams, 2006 were generally over 40 percent larger than the 1,400 in^3 array configurations proposed for use during this survey (e.g., 2,768 in^3, McCauley et al., 1998; 6,730 in^3, Bain and Williams, 2006). Thus, the Observatory's 160-dB threshold radius may not reach the threshold distances reported in these studies.

Currently NMFS is working on revising its noise exposure criteria based on the best and most recent scientific information. NMFS will use these criteria to develop methodologies to predict behavioral responses of marine mammals exposed to sound associated with seismic surveys (primary source is airguns). Although using a uniform sound pressure level of 160-dB re: 1 μPa for the onset of behavioral harassment for impulse noises may not capture all of the nuances of different marine mammal reactions to sound, it is an appropriate way to manage and regulate anthropogenic noise impacts on marine mammals until NMFS finalizes its acoustic guidelines.

Comment 18: COA et al. take issue with our conclusion that Level A take would not occur during the survey. Citing Lucke et al. (2009); Thompson et al. (1998); Kastak et al. (2008); Kujawa and Lieberman (2009); Wood et al. (2012); and Cox et al. (2006), the commenters assert that our preliminary determinations for Level A take and the likelihood of temporary and or permanent threshold shift do not consider the best available science.

Response: As explained in Table 3 in the notice of proposed authorization (79 FR 14779, March 17, 2014), the predicted distances at which sound levels could result in Level A harassment are relatively small (585 m; 1,919 ft for cetaceans and 157 m; 515 ft

for pinnipeds). As an added measure, we are requiring the Observatory to enlarge the Level A harassment exclusion zones for cetaceans and pinnipeds to further ensure the least practicable effect on marine mammals. We expect that the required vessel-based visual monitoring of the exclusion zones is appropriate to implement mitigation measures to prevent Level A harassment.

First, the Observatory will be required to establish larger Level A exclusion zones corresponding to the 177 and 187 dB re: 1 μPa isopleths for cetaceans and pinnipeds respectively, to avoid Level A harassment. If the protected species observers observe marine mammals approaching the exclusion zone, the Observatory must shut down or power down seismic operations to ensure that the marine mammal does not approach the applicable exclusion radius. Second, if the Observatory detects a marine mammal outside the 177- or 187-dB exclusion zones, and the animal – based on its position and the relative motion – is likely to enter the exclusion zone, the Observatory may alter the vessel's speed and/or course –when practical and safe – in combination with powering down or shutting down the airguns, to minimize the effects of the seismic survey. The avoidance behaviors discussed in the notice of proposed authorization (79 FR 14779, March 17, 2014) supports our expectations that individuals will avoid exposure at higher levels. Also, it is unlikely that animals would encounter repeated exposures at very close distances to the sound source because the Observatory would implement the required shutdown and power down mitigation measures to ensure that marine mammals do not approach the applicable exclusion zones for Level A harassment.

Regarding the Lucke et al. (2009) study, the authors found a threshold shift (TS) of a harbor porpoise after exposing it to airgun noise (single pulse) with a received sound

pressure level (SPL) at 200.2 dB (peak –to-peak) re: 1 μPa, which corresponds to a sound exposure level of 164.5 dB re: 1 μPa2 s after integrating exposure. We currently use the root-mean-square (rms) of received SPL at 180 dB and 190 dB re: 1 μPa as the threshold above which permanent threshold shift (PTS) could occur for cetaceans and pinnipeds, respectively. Because the airgun noise is a broadband impulse, one cannot directly extrapolate the equivalent of rms SPL from the reported peak-to-peak SPLs reported in Lucke et al. (2009). However, applying a conservative conversion factor of 16 dB for broadband signals from seismic surveys (Harris et al. 2001; McCauley et al. 2000) to correct for the difference between peak-to-peak levels reported in Lucke et al. (2009) and rms SPLs; the rms SPL for TTS would be approximately 184 dB re: 1 μPa, and the received levels associated with PTS (Level A harassment) would be higher. This is still above the current 180 dB rms re: 1 μPa threshold for injury. Yet, we recognize that the temporary threshold shift (TTS) of harbor porpoise is lower than other cetacean species empirically tested (Finneran et al. 2002; Finneran and Schlundt, 2010; Kastelein et al., 2012). We considered this information in the notice of proposed authorization (79 FR 14779, March 17, 2014).

The Thompson et al. (1998) telemetry study on harbor (Phoca vitulina) and grey seals (Halichoerus grypus) suggested that avoidance and other behavioral reactions by individual seals to small airgun sources may at times be strong, but short-lived. The researchers conducted 1-hour controlled exposure experiments exposing individual seals fitted with telemetry devices to small airguns with a reported source level of 215-224 dB re: 1 μPa (peak-to-peak) (Thompson et al., 1998; Gordon et al., 2003). The researchers measured dive behavior, swim speed heart rate and stomach temperature (indicator for

feeding), but they did not measure hearing threshold shift in the animals. The researchers observed startle responses, decreases in heart rate, and temporary cessation of feeding. In six out of eight trials, harbor seals exhibited strong avoidance behaviors, and swam rapidly away from the source (Thompson et al., 1998; Gordon et al., 2003). One seal showed no detectable response to the airguns, approaching within 300 m (984 ft) of the source (Gordon et al., 2003). However, they note that the behavioral responses were short-lived and the seals' behavior returned to normal after the trials (Thompson et al., 1998; Gordon et al., 2003). The study does not discuss temporary threshold shift or permanent threshold shift in harbor seals and the estimated rms SPL for this survey is approximately 200 dB re: 1 µPa, well above NMFS' current 180 dB rms re: 1 µPa threshold for injury for cetaceans and NMFS' current 190 dB rms re: 1 µPa threshold for injury for pinnipeds (accounting for the fact that the rms sound pressure level (in dB) is typically 16 dB less than the peak-to-peak level).

In a study on the effect of non-impulsive sound sources on marine mammal hearing, Kastak et al. (2008) exposed one harbor seal to an underwater 4.1 kHz pure tone fatiguing stimulus with a maximum received sound pressure of 184 dB re: 1 µPa for 60 seconds (Kastak et al., 2008; Finneran and Branstetter, 2013). A second 60-second exposure resulted in an estimated threshold shift of greater than 50 dB at a test frequency of 5.8 kHz (Kastak et al., 2008). The seal recovered at a rate of -10 dB per log(min). However, 2 months post-exposure, the researchers observed incomplete recovery from the initial threshold shift resulting in an apparent permanent threshold shift of 7 to 10 dB in the seal (Kastak et al., 2008). We note that seismic sound is an impulsive source, and

the context of the study is related to the effect of non-impulsive sounds on marine mammals.

We also considered two other Kastak et al. (1999, 2005) studies. Kastak et al. (1999) reported TTS of approximately 4-5 dB in three species of pinnipeds (harbor seal, California sea lion, and northern elephant seal) after underwater exposure for approximately 20 minutes to sound with frequencies ranging from 100-2,000 Hz at received levels 60-75 dB above hearing threshold. This approach allowed similar effective exposure conditions to each of the subjects, but resulted in variable absolute exposure values depending on subject and test frequency. Recovery to near baseline levels was reported within 24 hours of sound exposure. Kastak et al. (2005) followed up on their previous work, exposing the same test subjects to higher levels of sound for longer durations. The animals were exposed to octave-band sound for up to 50 minutes of net exposure. The study reported that the harbor seal experienced TTS of 6 dB after a 25-minute exposure to 2.5 kHz of octave-band sound at 152 dB (183 dB SEL). The California sea lion demonstrated onset of TTS after exposure to 174 dB (206 dB SEL).

We considered that PTS could occur at relatively lower levels, such as at levels that would normally cause TTS, if the animal experiences repeated exposures at very close distances to the sound source. However, an animal would need to stay very close to the sound source for an extended amount of time to incur a serious degree of PTS, which in this case, it would be highly unlikely due to the required mitigation measures in place to avoid Level A harassment and the expectation that a mobile marine mammal would generally avoid an area where received sound pulse levels exceed 160 dB re: 1 μPa (rms) (review in Richardson et al. 1995; Southall et al. 2007).

We also considered recent studies by Kujawa and Liberman (2009) and Lin et al. (2011). These studies found that despite completely reversible threshold shifts that leave cochlear sensory cells intact, large threshold shifts could cause synaptic level changes and delayed cochlear nerve degeneration in mice and guinea pigs, respectively. We note that the high level of TTS that led to the synaptic changes shown in these studies is in the range of the high degree of TTS that Southall et al. (2007) used to calculate PTS levels. It is not known whether smaller levels of TTS would lead to similar changes. NMFS, however, acknowledges the complexity of noise exposure on the nervous system, and will re-examine this issue as more data become available.

In contrast, a recent study on bottlenose dolphins (Schlundt, et al., 2013) measured hearing thresholds at multiple frequencies to determine the amount of TTS induced before and after exposure to a sequence of impulses produced by a seismic air gun. The airgun volume and operating pressure varied from 40-150 in^3 and 1000-2000 psi, respectively. After three years and 180 sessions, the authors observed no significant TTS at any test frequency, for any combinations of air gun volume, pressure, or proximity to the dolphin during behavioral tests (Schlundt, et al., 2013). Schlundt et al. (2013) suggest that the potential for airguns to cause hearing loss in dolphins is lower than previously predicted, perhaps as a result of the low-frequency content of airgun impulses compared to the high-frequency hearing ability of dolphins.

NEPA Concerns

Comment 19: COA et al. states that we should prepare an Environmental Impact Statement (EIS), not an EA, to adequately consider the potentially significant impacts of

the proposed Authorization, including the cumulative impacts and consideration of a full range of alternatives.

Response: We prepared an EA to evaluate whether significant environmental impacts may result from the issuance of an Authorization to the Observatory for the take of marine mammals incidental to conducting their seismic survey in the northwest Atlantic Ocean. After completing the EA, we determined that there would not be significant impacts to the human environment related to our issuance of an Authorization and accordingly issued a Finding of No Significant Impact (FONSI). Therefore, this action does not require an EIS.

Comment 20: COA et al. states that our analysis of alternatives in the EA was incomplete because the Foundation's EA did not sufficiently evaluate the No Action alternative.

Response: The NEPA and the implementing CEQ regulations (40 CFR parts 1500-1508) require consideration of alternatives to proposed major federal actions and NAO 216-6 provides agency policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including the No Action Alternative. This provides a baseline analysis against which we can compare the other alternatives.

Our EA titled, "Issuance of an Incidental Harassment Authorization to Lamont Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey in the Northwest Atlantic Ocean, June – August, 2014," addresses the potential environmental impacts of three choices available to us under section 101(a)(5)(D) of the MMPA, namely:

– Issue the Authorization to the Observatory for take, by Level B harassment, of marine mammals during the seismic survey, taking into account the prescribed means of take, mitigation measures, and monitoring requirements;

– Not issue an Authorization to the Observatory in which case, for the purposes of NEPA analysis only, we assume that the activities would proceed and cause incidental take without the mitigation and monitoring measures prescribed in the Authorization; or

– Issue the Authorization to the Observatory for take, by Level B harassment, of marine mammals during the seismic survey by incorporating additional required mitigation measures.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, an alternative meets the purpose and need if it satisfies the requirements under section 101(a)(5)(D) the MMPA. We evaluated each potential alternative against these criteria; identified two action alternatives along with the No Action Alternative; and carried these forward for evaluation in our EA.

General Comments

Comment 21: Two commenters expressed general opposition or general support for the survey.

Response: We acknowledge their comments and thank them for their interest.

Comment 22: COA et al. noted incorrect references to locations or project information that was incorrect.

Response: As published, the preamble to the notice of proposed Authorization on March 17, 2014 (79 FR 14779) contained minor, non-substantive errors related to locations, equipment, and species which may prove to be misleading but had no overall

effect on our preliminary determinations. We have removed those inadvertent errors from this notice.

Description of Marine Mammals in the Area of the Specified Activity

We provided information on the occurrence of marine mammals with possible or confirmed occurrence in the survey area in the notice of proposed Authorization on March 17, 2014 (79 FR 14779). The marine mammals most likely to be harassed in the action include 6 mysticetes, 18 odontocetes, and 3 pinniped species under our jurisdiction. Table 1 in this notice provides information on those species' regulatory status under the MMPA and the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.); abundance; occurrence and seasonality in the activity area.

Table 1 – Marine mammals most likely to be harassed incidental to the Observatory's survey.

Species	Stock Name	Regulatory Status[1, 2]	Abundance[3]	Occurrence and Range	Season
North Atlantic right whale	Western Atlantic	MMPA - D ESA – EN	455	common coastal/shelf	year-round[4]
Humpback whale	Gulf of Maine	MMPA - D ESA – EN	823	common coastal	spring - fall
Common minke whale	Canadian East Coast	MMPA - D ESA – NL	20,741	rare coastal/shelf	spring - summer
Sei whale	Nova Scotia	MMPA - D ESA – EN	357	uncommon shelf edge	spring
Fin whale	Western North Atlantic	MMPA - D ESA – EN	3,522	common pelagic	year-round
Blue whale	Western North Atlantic	MMPA - D ESA – EN	440	uncommon coastal/pelagic	occasional
Sperm whale	Nova Scotia	MMPA - D ESA – EN	2,288	common pelagic	year-round
Dwarf sperm whale	Western North Atlantic	MMPA - NC ESA – NL	1,783	uncommon shelf	year-round
Pygmy sperm whale	Western North Atlantic	MMPA - NC ESA – NL	1,783	uncommon shelf	year-round
Blainville's beaked whale	Western North Atlantic	MMPA - NC ESA – NL	7,092	uncommon shelf/pelagic	spring - summer
Cuvier's beaked whale	Western North Atlantic	MMPA - NC ESA – NL	6,532	uncommon shelf/pelagic	spring - summer
Gervais' beaked whale	Western North Atlantic	MMPA - NC ESA – NL	7,092	uncommon shelf/pelagic	spring - summer
Sowerby's beaked whale	Western North Atlantic	MMPA - NC ESA – NL	7,092	uncommon shelf/pelagic	spring - summer
True's beaked whale	Western North Atlantic	MMPA - NC ESA – NL	7,092	uncommon shelf/pelagic	spring - summer
Northern bottlenose whale	Western North Atlantic	MMPA - NC ESA – NL	unknown	rare pelagic	unknown

Bottlenose dolphin	Western North Atlantic Offshore	MMPA - NC ESA – NL	77,532	common pelagic	spring - summer
Bottlenose dolphin	Western North Atlantic Northern Migratory Coastal	MMPA - D ESA – NL	11,548	common coastal	summer
Atlantic spotted dolphin	Western North Atlantic	MMPA - NC ESA – NL	44,715	common coastal	summer - fall
Striped dolphin	Western North Atlantic	MMPA - NC ESA – NL	54,807	uncommon shelf	summer
Short-beaked common dolphin	Western North Atlantic	MMPA - NC ESA – NL	173,486	common shelf/pelagic	summer - fall
Atlantic white-sided-dolphin	Western North Atlantic	MMPA - NC ESA – NL	48,819	uncommon shelf/slope	summer - winter
Risso's dolphin	Western North Atlantic	MMPA - NC ESA – NL	18,250	common shelf/slope	year-round
Long-finned pilot whale	Western North Atlantic	MMPA - NC ESA – NL	26,535	uncommon shelf/pelagic	summer
Short-finned pilot whale	Western North Atlantic	MMPA - NC ESA – NL	21,515	uncommon shelf/pelagic	summer
Harbor porpoise	Gulf of Maine/Bay of Fundy	MMPA - NC ESA – NL	79,833	common coastal	year-round
Gray seal	Western North Atlantic	MMPA - NC ESA – NL	331,000	common coastal	fall - spring
Harbor seal	Western North Atlantic	MMPA - NC ESA – NL	70,142	common coastal	fall - spring
Harp seal	Western North Atlantic	MMPA - NC ESA – NL	7,100,000	rare, pack ice	Jan - May

[1] MMPA: D = Depleted, S = Strategic, NC = Not Classified.
[2] ESA: EN = Endangered, T = Threatened, DL = Delisted, NL = Not listed.
[3] 2013 NMFS Stock Assessment Report (Waring et al., 2014).
[4] Seasonality based on Whitt et al., 2013.

The Observatory presented species information in Table 2 of their application but excluded information on pinnipeds because they anticipated that these species would have a more northerly distribution during the summer and thus have a low likelihood of occurring in the survey area. Based on the best available information, we expect that certain pinniped species, however, have the potential to occur within the survey area and we have therefore included additional information for these species. For the Authorization, we considered authorizing take for pinnipeds based upon the best available density information (Read et al., 2009; DoN, 2007) and other anecdotal sources (MMSC, 2014).

We refer the public to the Observatory's application, the Foundation's EA (see ADDRESSES), our EA, and the 2013 NMFS Marine Mammal Stock Assessment Report available online at: http://www.nmfs.noaa.gov/pr/sars/species.htm for further information on the biology and local distribution of these species.

Potential Effects of the Specified Activities on Marine Mammals

We provided a summary and discussion of the ways that the types of stressors associated with the specified activity (e.g., seismic airgun operations, vessel movement, and entanglement) impact marine mammals (via observations or scientific studies) in the notice of proposed Authorization on March 17, 2014 (79 FR 14779).

The "Estimated Take by Incidental Harassment" section later in this document will include a quantitative discussion of the number of marine mammals anticipated to be taken by this activity. The "Negligible Impact Analysis" section will include a discussion of how this specific activity will impact marine mammals. The Negligible Impact analysis considers the anticipated level of take and the effectiveness of mitigation measures to draw conclusions regarding the likely impacts of this activity on the reproductive success or survivorship of individuals and from that on the affected marine mammal populations or stocks.

Operating active acoustic sources, such as airgun arrays, has the potential for adverse effects on marine mammals. The majority of anticipated impacts would be from the use of acoustic sources. The effects of sounds from airgun pulses might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and temporary or permanent hearing impairment or non-auditory effects (Richardson et al., 1995). However, for reasons discussed in the proposed Authorization, it is very unlikely

that there would be any cases of temporary or permanent hearing impairment resulting from the Observatory's activities. As outlined in previous NMFS documents, the effects of noise on marine mammals are highly variable, often depending on species and contextual factors (based on Richardson et al., 1995).

In the "Potential Effects of the Specified Activity on Marine Mammals" section of the notice of proposed Authorization on March 17, 2014 (79 FR 14779), we included a qualitative discussion of the different ways that the Observatory's seismic survey may potentially affect marine mammals. Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haulouts or rookeries).

Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals use acoustic signals for a variety of purposes, which differ among species, but include communication between individuals, navigation, foraging, reproduction, avoiding predators, and learning about their environment (Erbe and Farmer, 2000; Tyack, 2000). Masking, or auditory interference, generally occurs when sounds in the environment are louder than, and of a similar frequency as, auditory signals an animal is trying to receive. Masking is a phenomenon that affects animals that are trying to receive acoustic information about their environment, including sounds from other

members of their species, predators, prey, and sounds that allow them to orient in their environment. Masking these acoustic signals can disturb the behavior of individual animals, groups of animals, or entire populations. For the airgun sound generated from the Observatory's seismic survey, sound will consist of low frequency (under 500 Hz) pulses with extremely short durations (less than one second). Masking from airguns is more likely in low-frequency marine mammals like mysticetes. There is little concern that masking would occur near the sound source due to the brief duration of these pulses and relative silence between air gun shots (approximately 5 to 6 seconds). Masking is less likely for mid- to high-frequency cetaceans and pinnipeds.

Hearing impairment (either temporary or permanent) is also unlikely. Given the higher level of sound necessary to cause permanent threshold shift as compared with temporary threshold shift, it is considerably less likely that permanent threshold shift would occur during the seismic survey. Cetaceans generally avoid the immediate area around operating seismic vessels, as do some other marine mammals. Some pinnipeds show avoidance reactions to airguns.

The Langseth will operate at a relatively slow speed (typically 4.6 knots (8.5 km/h; 5.3 mph)) when conducting the survey. Protected species observers would implement mitigation measures to ensure the least practicable adverse effect to marine mammals. Therefore, NMFS neither anticipates nor will we authorize takes of marine mammals from ship strikes.

We refer the reader to the Observatory's application, our EA, and the Foundation's EA for additional information on the behavioral reactions (or lack thereof) by all types of marine mammals to seismic vessels. We have reviewed these data along with new

information submitted during the public comment period and determined them to be the best available information for the purposes of the Authorization.

Anticipated Effects on Marine Mammal Habitat

We included a detailed discussion of the potential effects of this action on marine mammal habitat, including physiological and behavioral effects on marine mammal prey items (e.g., fish and invertebrates) in the notice of proposed Authorization on March 17, 2014 (79 FR 14779) and in our EA. While we anticipate that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification, the impact to habitat is temporary and reversible. Further, we also considered these impacts to marine mammals in detail in the notice of proposed Authorization as behavioral modification. The main impact associated with the activity would be temporarily elevated noise levels and the associated direct effects on marine mammals.

Mitigation

In order to issue an incidental take authorization under section 101(a)(5)(D) of the MMPA, NMFS must prescribe, where applicable, the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant).

The Observatory has reviewed the following source documents and has incorporated a suite of proposed mitigation measures into their project description.

(1) Protocols used during previous Foundation and Observatory-funded seismic research cruises as approved by us and detailed in the Foundation's 2011 PEIS and 2013

EA;

(2) Previous incidental harassment authorization applications and authorizations that we have approved and authorized; and

(3) Recommended best practices in Richardson et al. (1995), Pierson et al. (1998), and Weir and Dolman, (2007).

To reduce the potential for disturbance from acoustic stimuli associated with the activities, the Observatory, and/or its designees have proposed to implement the following mitigation measures for marine mammals:

(1) Vessel-based visual mitigation monitoring;

(2) Proposed exclusion zones;

(3) Power down procedures;

(4) Shutdown procedures;

(5) Ramp-up procedures; and

(6) Speed and course alterations.

Vessel-based Visual Mitigation Monitoring

The Observatory would position observers aboard the seismic source vessel to watch for marine mammals near the vessel during daytime airgun operations and during any start-ups at night. Observers would also watch for marine mammals near the seismic vessel for at least 30 minutes prior to the start of airgun operations after an extended shutdown (i.e., greater than approximately eight minutes for this proposed cruise). When feasible, the observers would conduct observations during daytime periods when the seismic system is not operating for comparison of sighting rates and behavior with and without airgun operations and between acquisition periods. Based on the observations,

the Langseth would power down or shutdown the airguns when marine mammals are observed within or about to enter a designated 177-dB or 187-dB exclusion zone.

During seismic operations, at least four protected species observers would be aboard the Langseth. The Observatory would appoint the observers with our concurrence and they would conduct observations during ongoing daytime operations and nighttime ramp-ups of the airgun array. During the majority of seismic operations, two observers would be on duty from the observation tower to monitor marine mammals near the seismic vessel. Using two observers would increase the effectiveness of detecting animals near the source vessel. However, during mealtimes and bathroom breaks, it is sometimes difficult to have two observers on effort, but at least one observer would be on watch during bathroom breaks and mealtimes. Observers would be on duty in shifts of no longer than four hours in duration.

Two observers on the Langseth would also be on visual watch during all nighttime ramp-ups of the seismic airguns. A third observer would monitor the passive acoustic monitoring equipment 24 hours a day to detect vocalizing marine mammals present in the action area. In summary, a typical daytime cruise would have scheduled two observers (visual) on duty from the observation tower, and an observer (acoustic) on the passive acoustic monitoring system. Before the start of the seismic survey, the Observatory would instruct the vessel's crew to assist in detecting marine mammals and implementing mitigation requirements.

The Langseth is a suitable platform for marine mammal observations. When stationed on the observation platform, the eye level would be approximately 21.5 m (70.5 ft) above sea level, and the observer would have a good view around the entire vessel. During

daytime, the observers would scan the area around the vessel systematically with reticle binoculars (e.g., 7 x 50 Fujinon), Big-eye binoculars (25 x 150), and with the naked eye. During darkness, night vision devices would be available (ITT F500 Series Generation 3 binocular-image intensifier or equivalent), when required. Laser range-finding binoculars (Leica LRF 1200 laser rangefinder or equivalent) would be available to assist with distance estimation. They are useful in training observers to estimate distances visually, but are generally not useful in measuring distances to animals directly. The user measures distances to animals with the reticles in the binoculars.

When the observers see marine mammals within or about to enter the designated exclusion zone, the Langseth would immediately power down or shutdown the airguns. The observer(s) would continue to maintain watch to determine when the animal(s) are outside the exclusion zone by visual confirmation. Airgun operations would not resume until the observer has confirmed that the animal has left the zone, or if not observed after 15 minutes for species with shorter dive durations (small odontocetes and pinnipeds) or 30 minutes for species with longer dive durations (mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, killer, and beaked whales).

Exclusion Zones: The Observatory would use safety radii to designate exclusion zones and to estimate take for marine mammals. Table 2 shows the distances at which a marine mammal could potentially receive sound levels (160-, 177-, or 187-dB) from the airgun subarrays and a single airgun.

Table 2. Distances to which sound levels greater than or equal to 160, 177, and 187 dB re: 1 µPa could be received during the proposed survey offshore New Jersey in the north Atlantic Ocean, July through August, 2014.

Source and Volume (in^3)	Tow Depth (m)	Water Depth (m)	Predicted RMS Distances (m)

			187 dB	177 dB	160 dB
Single Bolt airgun (40 in^3)	6	< 100	31	109	995
4-Airgun subarray (700 in^3)	4.5	<100	151	561	5,240
4-Airgun subarray (700 in^3)	6	<100	175	651	6,100
8-Airgun subarray (1,400 in^3)	4.5	<100	190	709	6,670
8-Airgun subarray (1,400 in^3)	6	<100	234	886	8,150

The 180- or 190-dB level shutdown criteria are applicable to cetaceans and pinnipeds as specified by NMFS (2000). To be conservative, we are requiring the Observatory to establish the exclusion zones based upon the 187-dB and 177-dB isopleths which are approximately 3-dB lower than NMFS' existing shutdown criteria.

If the protected species visual observer detects marine mammal(s) within or about to enter the appropriate exclusion zone, the Langseth crew would immediately power down the airgun array, or perform a shutdown if necessary (see Shut-down Procedures).

Power Down Procedures–A power down involves decreasing the number of airguns in use such that the radius of the 177 or 187-dB zone is smaller to the extent that marine mammals are no longer within or about to enter the exclusion zone. A power down of the airgun array can also occur when the vessel is moving from one seismic line to another. During a power down for mitigation, the Langseth would operate one airgun (40 in^3). The continued operation of one airgun would alert marine mammals to the presence of the seismic vessel in the area. A shutdown occurs when the Langseth suspends all airgun

activity.

If the observer detects a marine mammal outside the exclusion zone and the animal is likely to enter the zone, the crew would power down the airguns to reduce the size of the 177- or 187-dB exclusion zone before the animal enters that zone. Likewise, if a mammal is already within the zone after detection, the crew would power-down the airguns immediately. During a power down of the airgun array, the crew would operate a single 40-in^3 airgun which has a smaller exclusion zone. If the observer detects a marine mammal within or near the smaller exclusion zone around the airgun (Table 2), the crew would shut down the single airgun (see next section).

Resuming Airgun Operations After a Power Down - Following a power-down, the Langseth crew would not resume full airgun activity until the marine mammal has cleared the 177- or 187-dB exclusion zone (see Table 2). The observers would consider the animal to have cleared the exclusion zone if:

- The observer has visually observed the animal leave the exclusion zone; or
- An observer has not sighted the animal within the exclusion zone for 15 minutes for species with shorter dive durations (i.e., small odontocetes or pinnipeds), or 30 minutes for species with longer dive durations (i.e., mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, and beaked whales); or

The Langseth crew would resume operating the airguns at full power after 15 minutes of sighting any species with short dive durations (i.e., small odontocetes or pinnipeds). Likewise, the crew would resume airgun operations at full power after 30 minutes of sighting any species with longer dive durations (i.e., mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, and beaked whales).

We estimate that the Langseth would transit outside the original 177- or 187-dB exclusion zone after an 8-minute wait period. This period is based on the average speed of the Langseth while operating the airguns (8.5 km/h; 5.3 mph). Because the vessel has transited away from the vicinity of the original sighting during the 8-minute period, implementing ramp-up procedures for the full array after an extended power down (i.e., transiting for an additional 35 minutes from the location of initial sighting) would not meaningfully increase the effectiveness of observing marine mammals approaching or entering the exclusion zone for the full source level and would not further minimize the potential for take. The Langseth's observers are continually monitoring the exclusion zone for the full source level while the mitigation airgun is firing. On average, observers can observe to the horizon (10 km; 6.2 mi) from the height of the Langseth's observation deck and should be able to say with a reasonable degree of confidence whether a marine mammal would be encountered within this distance before resuming airgun operations at full power.

Shutdown Procedures – The Langseth crew would shutdown the operating airgun(s) if they see a marine mammal within or approaching the exclusion zone for the single airgun. The crew would implement a shutdown:

(1) If an animal enters the exclusion zone of the single airgun after the crew has initiated a power down; or

(2) If an observer sees the animal is initially within the exclusion zone of the single airgun when more than one airgun (typically the full airgun array) is operating.

Considering the conservation status for North Atlantic right whales, the Langseth crew would shutdown the airgun(s) immediately in the unlikely event that observers

detect this species, regardless of the distance from the vessel. The Langseth would only begin ramp-up if observers have not seen the North Atlantic right whale for 30 minutes.

Resuming Airgun Operations After a Shutdown - Following a shutdown in excess of eight minutes, the Langseth crew would initiate a ramp-up with the smallest airgun in the array (40-in^3). The crew would turn on additional airguns in a sequence such that the source level of the array would increase in steps not exceeding 6 dB per five-minute period over a total duration of approximately 30 minutes. During ramp-up, the observers would monitor the exclusion zone, and if he/she sees a marine mammal, the Langseth crew would implement a power down or shutdown as though the full airgun array were operational.

During periods of active seismic operations, there are occasions when the Langseth crew would need to temporarily shut down the airguns due to equipment failure or for maintenance. In this case, if the airguns are inactive longer than eight minutes, the crew would follow ramp-up procedures for a shutdown described earlier and the observers would monitor the full exclusion zone and would implement a power down or shutdown if necessary.

If the full exclusion zone is not visible to the observer for at least 30 minutes prior to the start of operations in either daylight or nighttime, the Langseth crew would not commence ramp-up unless at least one airgun (40-in^3 or similar) has been operating during the interruption of seismic survey operations. Given these provisions, it is likely that the vessel's crew would not ramp up the airgun array from a complete shutdown at night or in thick fog, because the outer part of the zone for that array would not be visible during those conditions.

If one airgun has operated during a power down period, ramp-up to full power would be permissible at night or in poor visibility, on the assumption that marine mammals would be alerted to the approaching seismic vessel by the sounds from the single airgun and could move away. The vessel's crew would not initiate a ramp-up of the airguns if an observer sees the marine mammal within or near the applicable exclusion zones during the day or close to the vessel at night.

Ramp-up Procedures – Ramp-up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of airguns firing until the full volume of the airgun array is achieved. The purpose of a ramp-up is to "warn" marine mammals in the vicinity of the airguns, and to provide the time for them to leave the area and thus avoid any potential injury or impairment of their hearing abilities. The Observatory would follow a ramp-up procedure when the airgun array begins operating after an 8 minute period without airgun operations or when shut down has exceeded that period. The Observatory has used similar waiting periods (approximately eight to 10 minutes) during previous seismic surveys.

Ramp-up would begin with the smallest airgun in the array (40 in^3). The crew would add airguns in a sequence such that the source level of the array would increase in steps not exceeding six dB per five minute period over a total duration of approximately 30 to 35 minutes. During ramp-up, the observers would monitor the exclusion zone, and if marine mammals are sighted, the Observatory would implement a power-down or shut-down as though the full airgun array were operational.

If the complete exclusion zone has not been visible for at least 30 minutes prior to the start of operations in either daylight or nighttime, the Observatory would not commence

the ramp-up unless at least one airgun (40 in^3 or similar) has been operating during the interruption of seismic survey operations. Given these provisions, it is likely that the crew would not ramp up the airgun array from a complete shut-down at night or in thick fog, because the outer part of the exclusion zone for that array would not be visible during those conditions. If one airgun has operated during a power-down period, ramp-up to full power would be permissible at night or in poor visibility, on the assumption that marine mammals would be alerted to the approaching seismic vessel by the sounds from the single airgun and could move away. The Observatory would not initiate a ramp-up of the airguns if an observer sights a marine mammal within or near the applicable exclusion zones.

Speed and Course Alterations

If during seismic data collection, the Observatory detects marine mammals outside the exclusion zone and, based on the animal's position and direction of travel, is likely to enter the exclusion zone, the Langseth would change speed and/or direction if this does not compromise operational safety. Due to the limited maneuverability of the primary survey vessel, altering speed and/or course can result in an extended period of time to realign onto the transect. However, if the animal(s) appear likely to enter the exclusion zone, the Langseth would undertake further mitigation actions, including a power down or shut down of the airguns.

Mitigation Conclusions

We have carefully evaluated the Observatory's proposed mitigation measures in the context of ensuring that we prescribe the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of

potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Any mitigation measure(s) prescribed by us should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed here:

1. Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).

2. A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to airgun operations that we expect to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

3. A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to airgun operations that we expect to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

4. A reduction in the intensity of exposures (either total number or number at biologically important time or location) to airgun operations that we expect to result in

the take of marine mammals (this goal may contribute to a, above, or to reducing the severity of harassment takes only).

5. Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.

6. For monitoring directly related to mitigation—an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on the evaluation of the Observatory's proposed measures, as well as other measures considered, we have determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for Authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that we expect to be present in the proposed action area.

The Observatory submitted a marine mammal monitoring plan in section XIII of the Authorization application. This description is not repeated here as we have not changed the monitoring plan between the proposed Authorization and our final Authorization.

Monitoring measures prescribed by NMFS should accomplish one or more of the following general goals:

1. An increase in the probability of detecting marine mammals, both within the mitigation zone (thus allowing for more effective implementation of the mitigation) and during other times and locations, in order to generate more data to contribute to the analyses mentioned later;

2. An increase in our understanding of how many marine mammals would be affected by seismic airguns and other active acoustic sources and the likelihood of associating those exposures with specific adverse effects, such as behavioral harassment, temporary or permanent threshold shift;

3. An increase in our understanding of how marine mammals respond to stimuli that we expect to result in take and how those anticipated adverse effects on individuals (in different ways and to varying degrees) may impact the population, species, or stock (specifically through effects on annual rates of recruitment or survival) through any of the following methods:

    a. Behavioral observations in the presence of stimuli compared to observations in the absence of stimuli (i.e., we need to be able to accurately predict received level, distance from source, and other pertinent information);

b. Physiological measurements in the presence of stimuli compared to observations in the absence of stimuli (i.e., we need to be able to accurately predict received level, distance from source, and other pertinent information);

c. Distribution and/or abundance comparisons in times or areas with concentrated stimuli versus times or areas without stimuli;

4. An increased knowledge of the affected species; and

5. An increase in our understanding of the effectiveness of certain mitigation and monitoring measures.

Monitoring Measures:

The Observatory proposes to sponsor marine mammal monitoring during the present project to supplement the mitigation measures that require real-time monitoring, and to satisfy the monitoring requirements of the Authorization. We have not changed the monitoring plan between the proposed Authorization and our final Authorization. The Observatory planned the monitoring work as a self-contained project independent of any other related monitoring projects that may occur in the same regions at the same time. Further, the Observatory is prepared to discuss coordination of its monitoring program with any other related work that might be conducted by other groups working insofar as it is practical for the Observatory.

Vessel-Based Passive Acoustic Monitoring

Passive acoustic monitoring would complement the visual mitigation monitoring program, when practicable. Visual monitoring typically is not effective during periods of poor visibility or at night, and even with good visibility, is unable to detect marine mammals when they are below the surface or beyond visual range. Passive acoustical

monitoring can improve detection, identification, and localization of cetaceans when used in conjunction with visual observations. The passive acoustic monitoring would serve to alert visual observers (if on duty) when vocalizing cetaceans are detected. It is only useful when marine mammals call, but it can be effective either by day or by night, and does not depend on good visibility. The acoustic observer would monitor the system in real time so that he/she can advise the visual observers if they acoustic detect cetaceans.

The passive acoustic monitoring system consists of hardware (i.e., hydrophones) and software. The "wet end" of the system consists of a towed hydrophone array connected to the vessel by a tow cable. The tow cable is 250 m (820.2 ft) long and the hydrophones are fitted in the last 10 m (32.8 ft) of cable. A depth gauge, attached to the free end of the cable, which is typically towed at depths less than 20 m (65.6 ft). The Langseth crew would deploy the array from a winch located on the back deck. A deck cable would connect the tow cable to the electronics unit in the main computer lab where the acoustic station, signal conditioning, and processing system would be located. The Pamguard software amplifies, digitizes, and then processes the acoustic signals received by the hydrophones. The system can detect marine mammal vocalizations at frequencies up to 250 kHz.

One acoustic observer, an expert bioacoustician with primary responsibility for the passive acoustic monitoring system would be aboard the Langseth in addition to the four visual observers. The acoustic observer would monitor the towed hydrophones 24 hours per day during airgun operations and during most periods when the Langseth is underway while the airguns are not operating. However, passive acoustic monitoring may not be possible if damage occurs to both the primary and back-up hydrophone arrays during

operations. The primary passive acoustic monitoring streamer on the Langseth is a digital hydrophone streamer. Should the digital streamer fail, back-up systems should include an analog spare streamer and a hull-mounted hydrophone.

One acoustic observer would monitor the acoustic detection system by listening to the signals from two channels via headphones and/or speakers and watching the real-time spectrographic display for frequency ranges produced by cetaceans. The observer monitoring the acoustical data would be on shift for one to six hours at a time. The other observers would rotate as an acoustic observer, although the expert acoustician would be on passive acoustic monitoring duty more frequently.

When the acoustic observer detects a vocalization while visual observations are in progress, the acoustic observer on duty would contact the visual observer immediately, to alert him/her to the presence of cetaceans (if they have not already been seen), so that the vessel's crew can initiate a power down or shutdown, if required. During non-daylight hours, when a cetacean is detected by acoustic monitoring and may be close to the source vessel, the Langseth crew would be notified immediately so that the proper mitigation measure may be implemented. The observer would enter the information regarding the call into a database. Data entry would include an acoustic encounter identification number, whether it was linked with a visual sighting, date, time when first and last heard and whenever any additional information was recorded, position and water depth when first detected, bearing if determinable, species or species group (e.g., unidentified dolphin, sperm whale), types and nature of sounds heard (e.g., clicks, continuous, sporadic, whistles, creaks, burst pulses, strength of signal, etc.), and any other notable information. Acousticians record the acoustic detection for further analysis.

Observer Data and Documentation

Observers would record data to estimate the numbers of marine mammals exposed to various received sound levels and to document apparent disturbance reactions or lack thereof. They would use the data to estimate numbers of animals potentially 'taken' by harassment (as defined in the MMPA). They will also provide information needed to order a power down or shut down of the airguns when a marine mammal is within or near the exclusion zone.

When an observer makes a sighting, they will record the following information:

1. Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, sighting cue, apparent reaction to the airguns or vessel (e.g., none, avoidance, approach, paralleling, etc.), and behavioral pace.

2. Time, location, heading, speed, activity of the vessel, sea state, visibility, and sun glare.

The observer will record the data listed under (2) at the start and end of each observation watch, and during a watch whenever there is a change in one or more of the variables.

Observers will record all observations and power downs or shutdowns in a standardized format and will enter data into an electronic database. The observers will verify the accuracy of the data entry by computerized data validity checks during data entry and by subsequent manual checking of the database. These procedures will allow the preparation of initial summaries of data during and shortly after the field program, and will facilitate transfer of the data to statistical, graphical, and other programs for

further processing and archiving.

Results from the vessel-based observations will provide:

1. The basis for real-time mitigation (airgun power down or shutdown).

2. Information needed to estimate the number of marine mammals potentially taken by harassment, which the Observatory must report to the Office of Protected Resources.

3. Data on the occurrence, distribution, and activities of marine mammals and turtles in the area where the Observatory would conduct the seismic study.

4. Information to compare the distance and distribution of marine mammals and turtles relative to the source vessel at times with and without seismic activity.

5. Data on the behavior and movement patterns of marine mammals detected during non-active and active seismic operations.

Reporting

The Observatory would submit a report to us and to the Foundation within 90 days after the end of the cruise. The report would describe the operations conducted and sightings of marine mammals and turtles near the operations. The report would provide full documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day report would summarize the dates and locations of seismic operations, and all marine mammal sightings (dates, times, locations, activities, associated seismic survey activities). The report would also include estimates of the number and nature of exposures that could result in “takes” of marine mammals by harassment or in other ways.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner not permitted by the authorization (if issued), such as an

injury, serious injury, or mortality (e.g., ship-strike, gear interaction, and/or entanglement), the Observatory shall immediately cease the specified activities and immediately report the take to the Incidental Take Program Supervisor, Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and ITP.Cody@noaa.gov and the Northeast Regional Stranding Coordinator at (978) 281-9300. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

The Observatory shall not resume its activities until we are able to review the circumstances of the prohibited take. We shall work with the Observatory to determine what is necessary to minimize the likelihood of further prohibited take and ensure

MMPA compliance. The Observatory may not resume their activities until notified by us via letter, email, or telephone.

In the event that the Observatory discovers an injured or dead marine mammal, and the lead visual observer determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as we describe in the next paragraph), the Observatory will immediately report the incident to the Incidental Take Program Supervisor, Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and ITP.Cody@noaa.gov and the Northeast Regional Stranding Coordinator at (978) 281-9300. The report must include the same information identified in the paragraph above this section. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with the Observatory to determine whether modifications in the activities are appropriate.

In the event that the Observatory discovers an injured or dead marine mammal, and the lead visual observer determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the Observatory would report the incident to the Incidental Take Program Supervisor, Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and ITP.Cody@noaa.gov and the Northeast Regional Stranding Coordinator at (978) 281-9300, within 24 hours of the discovery. Activities may continue while NMFS reviews the circumstances of the incident. The Observatory would provide photographs or video footage (if available) or other documentation of the stranded animal

sighting to NMFS.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Acoustic stimuli (i.e., increased underwater sound) generated during the operation of the airgun sub-arrays have the potential to result in the behavioral disturbance of some marine mammals. Thus, NMFS proposes to authorize take by Level B harassment resulting from the operation of the sound sources for the proposed seismic survey based upon the current acoustic exposure criteria shown in Table 3. Our practice has been to apply the 160 dB re: 1 μPa received level threshold for underwater impulse sound levels to determine whether take by Level B harassment occurs. Southall et al. (2007) provides a severity scale for ranking observed behavioral responses of both free-ranging marine mammals and laboratory subjects to various types of anthropogenic sound (see Table 4 in Southall et al. [2007]).

Table 3. NMFS' Current Acoustic Exposure Criteria

Criterion	Criterion Definition	Threshold
Level A Harassment (Injury)	Permanent Threshold Shift (PTS) (Any level above that which is known to cause TTS)	180 dB re 1 microPa-m (cetaceans) / 190 dB re 1 microPa-m (pinnipeds) root mean square (rms)
Level B Harassment	Behavioral Disruption (for impulse noises)	160 dB re 1 microPa-m (rms)

The probability of vessel and marine mammal interactions (i.e., ship strike) occurring

during the proposed survey is unlikely due to the Langseth's slow operational speed, which is typically 4.6 kts (8.5 km/h; 5.3 mph). Outside of seismic operations, the Langseth's cruising speed would be approximately 11.5 mph (18.5 km/h; 10 kts) which is generally below the speed at which studies have noted reported increases of marine mammal injury or death (Laist et al., 2001). In addition, the Langseth has a number of other advantages for avoiding ship strikes as compared to most commercial merchant vessels, including the following: the Langseth's bridge offers good visibility to visually monitor for marine mammal presence; observers posted during operations scan the ocean for marine mammals and must report visual alerts of marine mammal presence to crew; and the observers receive extensive training that covers the fundamentals of visual observing for marine mammals and information about marine mammals and their identification at sea. Thus, NMFS does not anticipate that take, in the form of vessel strike, would result from the movement of the vessel.

The Observatory did not estimate any additional take allowance for animals that could be affected by sound sources other than the airguns. We do not expect that the sound levels produced by the echosounder, sub-bottom profiler, and ADCP would exceed the sound levels produced by the airguns for the majority of the time. Because of the beam pattern and directionality of these sources, combined with their lower source levels, it is not likely that these sources would take marine mammals independently from the takes that the Observatory has estimated to result from airgun operations. Therefore, we do not believe it is necessary to authorize additional takes for these sources for the action at this time. We are currently evaluating the broader use of these types of sources to determine under what specific circumstances coverage for incidental take would or would

not be advisable. We are working on guidance that would outline a consistent recommended approach for applicants to address the potential impacts of these types of sources.

NMFS considers the probability for entanglement of marine mammals to be low because of the vessel speed and the monitoring efforts onboard the survey vessel. Therefore, NMFS does not believe it is necessary to authorize additional takes for entanglement at this time.

There is no evidence that planned activities could result in serious injury or mortality within the specified geographic area for the requested Authorization. The required mitigation and monitoring measures would minimize any potential risk for serious injury or mortality.

The following sections describe the Observatory's methods to estimate take by incidental harassment. The Observatory based their estimates on the number of marine mammals that could be harassed by seismic operations with the airgun sub-array during approximately 4,900 km^2 (approximately 1,926.6 square miles (mi^2) of transect lines in the northwest Atlantic Ocean as depicted in Figure 1 (Figure 1 of the Observatory's application).

Ensonified Area Calculations: In order to estimate the potential number of marine mammals exposed to airgun sounds, the Observatory considers the total marine area within the 160-dB radius around the operating airguns. This ensonified area includes areas of overlapping transect lines. They determine the ensonified area by entering the planned survey lines into a MapInfo GIS, using the software to identify the relevant areas

by "drawing" the applicable 160-dB buffer (see Table 2) around each seismic line, and then calculate the total area within the buffers.

Because the Observatory assumes that the Langseth may need to repeat some tracklines, accommodate the turning of the vessel, address equipment malfunctions, or conduct equipment testing to complete the survey, they have increased the proposed number of line-kilometers for the seismic operations from approximately 2,002 km^2 (1,244 mi) by 25 percent to 2,502 km^2 (1,555 mi) to account for these contingency operations.

Exposure Estimates: The Observatory calculates the numbers of different individuals potentially exposed to approximately 160 dB re: 1 μPa_{rms} by multiplying the expected species density estimates (in number/km^2) for that area in the absence of a seismic program times the estimated area of ensonification (i.e., 2,502 km^2; 1,555 mi).

Table 3 of their application presents their estimates of the number of different individual marine mammals that could potentially experience exposures greater than or equal to 160 dB re: 1 µPa (rms) during the seismic survey if no animals moved away from the survey vessel. The Observatory used the Strategic Environmental Research and Development Program's (SERDP) spatial decision support system (SDSS) Marine Animal Model Mapper tool (Read et al., 2009) to calculate cetacean densities within the survey area based on the U.S. Navy's "OPAREA Density Estimates" (NODE) model (DoN, 2007). The NODE model derives density estimates using density surface modeling of the existing line-transect data, which uses sea surface temperature, chlorophyll *a*, depth, longitude, and latitude to allow extrapolation to areas/seasons where marine mammal survey data collection did not occur. The Observatory used the SERDP SDSS tool to

obtain mean densities in a polygon the size of the seismic survey area for cetacean species during summer (June through August).

For the Authorization, we reviewed the Observatory's take estimates presented in Table 3 of their application and have revised the take calculations for several species based upon the best available density information from the SERDP SDSS Marine Animal Model Mapper tool for the spring and summer months, survey information from Palka (2012), species presence from the New Jersey Department of Environmental Protection Baseline Studies Final Report Volume III: Marine Mammal and Sea Turtle Studies, and stranding records from the New Jersey Marine Mammal Stranding Center. These include takes for blue, fin, humpback, minke, North Atlantic right, and sei whales; harbor porpoise; and gray, harbor, and harp seals.

For North Atlantic right whales, we used the SERDP SDSS Marine Animal Model Mapper tool NODES spring model to obtain mean densities in a polygon the size of the seismic survey area. To be conservative, we increased the estimated take of 1 individual to 3 to account for a cow/calf pair based on information from Whitt et al. (2013).

For blue and humpback whales, we used the SERDP SDSS Duke Habitat Model for baleen and humpback whales, respectively to obtain the summer mean densities in a polygon the size of the seismic survey area for those species.

For species where the SERDP SDSS NODES summer model produced a density estimate of zero, we increased the take estimates based on generalized group size data from Palka (2012). Those species include: humpback, fin, sei, and minke whales; striped dolphins, short-beaked common dolphins, and Atlantic white-sided dolphins. For gray and harp seals, we increased the take estimates based on stranding data from the New

Jersey Marine Mammal Stranding Center.

For harbor porpoise and harbor seals, we also used the SERDP SDSS Marine Animal Model Mapper tool NODES spring model to obtain mean densities in a polygon the size of the seismic survey area.

The Observatory's approach for estimating take does not allow for turnover in the marine mammal populations in the area during the course of the survey. To correct this potential underestimation, we have increased the proposed take estimates for odontocetes (excluding sperm whales) and pinnipeds by a factor of 25 percent to conservatively account for new animals entering or passing through the ensonified area.

Table 4 presents the revised estimates of the possible numbers of marine mammals exposed to sound levels greater than or equal to 160 dB re: 1 μPa during the proposed seismic survey.

Table 4 - Densities and estimates of the possible numbers of marine mammals exposed to sound levels greater than or equal to 160 dB re: 1 µPa during the proposed seismic survey in the north Atlantic Ocean, during July through August, 2014.

Species	Density Estimate[1]	Modeled Number of Individuals Exposed to Sound Levels ≥ 160 dB	Proposed Take Authorization[2]	Percent of Species or Stock[3]	Population Trend[3]
North Atlantic right whale	0.283[4]	1	3	0.66	Increasing
Humpback whale	0.044[5]	1	2[2]	0.24	Increasing
Common minke whale	0	0	2[2]	0.01	No data
Sei whale	0.161	1	2[2]	0.56	No data
Fin whale	0.002	1	2[2]	0.06	No data
Blue whale	6.73[6]	17	17	3.86	No data
Sperm whale	7.06	18	18	0.79	No data
Dwarf sperm whale	0.001	2	3	0.17	No data
Pygmy sperm whale	0.001	2	3	0.17	No data
Cuvier's beaked whale	0.124	3	4	0.06	No data
Gervais' beaked whale	0.124	3	4	0.06	No data
Sowerby's beaked whale	0.124	3	4	0.06	No data
Unidentified Mesoplodon /Ziphid: True's, Blainville, northern bottlenose whale	0.124	1	4	0.06	No data
Rough-toothed dolphin	0	0	0	0	No data
Bottlenose dolphin (pelagic)	111.3	279	349	0.45	No data
Bottlenose dolphin (coastal)	111.3	279	349	3.02	No data
Pantropical spotted dolphin	0	0	0	0	No data
Atlantic spotted dolphin	36.1	90	113	0.25	No data
Spinner dolphin	0	0	0	0	No data
Striped dolphin	0	0	59	0.11	No data
Short-beaked common dolphin	0	0	23	0.01	No data
White-beaked dolphin	0	0	0	0	No data
Atlantic white-sided dolphin	0	0	19	0.04	No data
Risso's dolphin	13.6	35	44	0.24	No data
False killer whale	0	0	0	0	No data
Pygmy killer whale	0	0	0	0	No data
Killer whale	0	0	0	0	No data
Long-finned pilot whale	0.184	1	12	0.05	No data
Short-finned pilot whale	0.184	1	12	0.06	No data
Harbor porpoise	0.008[4]	1	3	0.0038	No data
Gray seal	0	0	15	0.005	Increasing
Harbor seal	44.43[4]	112	140	0.20	No data
Harp seal	0	0	5	0.00007	Increasing

[1] Except where noted, densities are the mean values for the survey area calculated from the SERDP SDSS NODES summer model (Read et al., 2009) as presented in Table 3 of the Observatory's application.

[2] Proposed take includes increases for mean group size or cow/calf pairs based on Palka, 2012; NJDEP, 2010; or increases for gray and harp seals based on stranding data from the NJ Marine Mammal Stranding Center. We have also increased the proposed take estimates by a factor of 25 percent to conservatively account for new animals entering or passing through the ensonified area.

[3] Table 1 in this notice lists the stock species abundance estimates used in calculating the percentage of species/stock. Population trend information from Waring et al., 2013. No data = Insufficient data to determine population trend.

[4] NMFS revised estimate based on the NODES model using the spring mean density estimate for that species in survey area.

[5] NMFS revised estimate based on the SERDP SDSS Duke Habitat Model using the summer mean density estimate for humpback whales in survey area.

[6] NMFS revised estimate based on the SERDP SDSS Duke Habitat Model using the summer mean density estimate for baleen whales in survey area.

Encouraging and Coordinating Research

The Observatory would coordinate the planned marine mammal monitoring program associated with the seismic survey in the northwest Atlantic Ocean with applicable U.S. agencies.

Analysis and Determinations

Negligible Impact

Negligible impact' is "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival'' (50 CFR 216.103). The lack of likely adverse effects on annual rates of recruitment or survival (i.e., population level effects) forms the basis of a negligible impact finding. Thus, an estimate of the number of Level B harassment takes, alone, is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through behavioral harassment, we must consider other factors, such as the likely nature of any responses (their intensity, duration, etc.), the context of any responses (critical reproductive time or location, migration, etc.), as well as the number and nature of estimated Level A harassment takes, and the number of estimated mortalities, effects on habitat, and the status of the species.

In making a negligible impact determination, we consider:

- The number of anticipated injuries, serious injuries, or mortalities;
- The number, nature, and intensity, and duration of Level B harassment; and
- The context in which the takes occur (e.g., impacts to areas of significance, impacts to local populations, and cumulative impacts when taking into account

successive/contemporaneous actions when added to baseline data);

- The status of stock or species of marine mammals (i.e., depleted, not depleted, decreasing, increasing, stable, impact relative to the size of the population);
- Impacts on habitat affecting rates of recruitment/survival; and
- The effectiveness of monitoring and mitigation measures to reduce the number or severity of incidental take.

For reasons stated previously in this document and based on the following factors, the Observatory's specified activities are not likely to cause long-term behavioral disturbance, permanent threshold shift, or other non-auditory injury, serious injury, or death. They include:

- The anticipated impacts of the Observatory's survey activities on marine mammals are temporary behavioral changes due to avoidance of the area.
- The likelihood that marine mammals approaching the survey area will likely be traveling through the or opportunistically foraging within the vicinity. Marine mammals transiting within the vicinity of survey operations will be transient as no breeding, calving, pupping, or nursing areas, or haul-outs, overlap with the survey area.
- The low potential of the survey to cause an effect on coastal bottlenose dolphin populations due to the fact that the Observatory's study area is approximately 20 km (12 mi) away from the identified habitats for coastal bottlenose dolphins and their calves.
- The low likelihood that North Atlantic right whales would be exposed to sound levels greater than or equal to 160 dB re: 1 μPa due to the requirement that the Langseth crew must shutdown the airgun(s) immediately if observers detect this species, at any distance from the vessel.

- The anticipated impacts of the Observatory's survey activities on marine mammals are temporary behavioral changes due to avoidance of the area.
- The likelihood that, given sufficient notice through relatively slow ship speed, we expect marine mammals to move away from a noise source that is annoying prior to its becoming potentially injurious;
- The availability of alternate areas of similar habitat value for marine mammals to temporarily vacate the survey area during the operation of the airgun(s) to avoid acoustic harassment;
- We also expect that the seismic survey would have no more than a temporary and minimal adverse effect on any fish or invertebrate species that serve as prey species for marine mammals, and therefore consider the potential impacts to marine mammal habitat minimal;
- The relatively low potential for temporary or permanent hearing impairment and the likelihood that the Observatory would avoid this impact through the incorporation of the required monitoring and mitigation measures (including the incorporation of larger exclusion zones for Level A Harassment, power-downs, and shutdowns); and
- The high likelihood that trained visual protected species observers would detect marine mammals at close proximity to the vessel.

NMFS does not anticipate that any injuries, serious injuries, or mortalities would occur as a result of the Observatory's proposed activities, and NMFS does not propose to authorize injury, serious injury, or mortality at this time.

We anticipate only behavioral disturbance to occur primarily in the form of avoidance behavior to the sound source during the conduct of the survey activities. Further, the

additional mitigation measure requiring the Observatory to increase the size of the Level A harassment exclusion zones will effect the least practicable impact marine mammals.

Table 4 in this document outlines the number of requested Level B harassment takes that we anticipate as a result of these activities. NMFS anticipates that 27 marine mammal species (6 mysticetes, 18 odontocetes, and 3 pinnipeds) under our jurisdiction would likely occur in the proposed action area. Of the marine mammal species under our jurisdiction that are known to occur or likely to occur in the study area, six of these species are listed as endangered under the ESA and depleted under the MMPA, including: the blue, fin, humpback, north Atlantic right, sei, and sperm whales.

Due to the nature, degree, and context of Level B (behavioral) harassment anticipated and described (see "Potential Effects on Marine Mammals" section in this notice), we do not expect the activity to impact rates of recruitment or survival for any affected species or stock. In addition, the seismic surveys would not take place in areas of significance for marine mammal feeding, resting, breeding, or calving and would not adversely impact marine mammal habitat, including the identified habitats for coastal bottlenose dolphins and their calves.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (i.e., 24 hour cycle). Behavioral reactions to noise exposure (such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall et al., 2007). While we anticipate that the seismic operations would occur on consecutive days, the estimated duration of the survey would last no more than 30 days. Specifically, the airgun array moves continuously over 10s of

kilometers daily, as do the animals, making it unlikely that the same animals would be continuously exposed over multiple consecutive days. Additionally, the seismic survey would increase sound levels in the marine environment in a relatively small area surrounding the vessel (compared to the range of the animals), which is constantly travelling over distances, and some animals may only be exposed to and harassed by sound for less than a day.

In summary, we expect marine mammals to avoid the survey area, thereby reducing the risk of exposure and impacts. We do not anticipate disruption to reproductive behavior and there is no anticipated effect on annual rates of recruitment or survival of affected marine mammals.

Based on this notice's analysis of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS finds that the Observatory's proposed seismic survey would have a negligible impact on the affected marine mammal species or stocks.

Small Numbers

As mentioned previously, NMFS estimates that the Observatory's activities could potentially affect, by Level B harassment only, 27 species of marine mammals under our jurisdiction. For each species, these estimates constitute small numbers (each, less than or equal to four percent) relative to the population size and we have provided the regional population estimates for the marine mammal species that may be taken by Level B harassment in Table 4 in this notice.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that the Observatory's proposed activity would take small numbers of marine mammals relative to the populations of the affected species or stocks.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action.

Endangered Species Act (ESA)

There are six marine mammal species that may occur in the proposed survey area, several are listed as endangered under the Endangered Species Act, including the blue, fin, humpback, north Atlantic right, sei, and sperm whales. Under section 7 of the ESA, the Foundation has initiated formal consultation with NMFS on the proposed seismic survey. NMFS (i.e., National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division) also consulted with NMFS on the proposed issuance of an Authorization under section 101(a)(5)(D) of the MMPA. NMFS consolidated those consultations in a single Biological Opinion.

On June 30, 2014, the Endangered Species Act Interagency Cooperation Division issued an Opinion to us and the Foundation which concluded that the issuance of the Authorization and the conduct of the seismic survey were not likely to jeopardize the continued existence of blue, fin, humpback, North Atlantic right, sei, and sperm whales. The Opinion also concluded that the issuance of the Authorization and the conduct of the seismic survey would not affect designated critical habitat for these species.

National Environmental Policy Act (NEPA)

The Foundation has prepared an EA titled, "Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, June–July 2014," prepared by LGL, Ltd. environmental research associates, on behalf of the Foundation and the Observatory. We have also prepared an EA titled, "Issuance of an Incidental Harassment Authorization to Lamont Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey in the Northwest Atlantic Ocean, June – August, 2014," and FONSI in accordance with NEPA and NOAA Administrative Order 216-6. We provided relevant environmental information to the public through our notice of proposed Authorization (79 FR 14779, March 17, 2014) and considered public comments received prior to finalizing our EA and deciding whether or not to issue a Finding of No Significant Impact (FONSI). We concluded that issuance of an Incidental Harassment Authorization would not significantly affect the quality of the human environment and have issued a FONSI. Because of this finding, it is not necessary to prepare an environmental impact statement for the issuance of an Authorization to the Observatory for this activity. Our EA and FONSI for this activity are available upon request (see ADDRESSES).

Authorization

We have issued an Incidental Harassment Authorization to the Observatory for the take of marine mammals incidental to conducting a marine seismic survey in the Atlantic Ocean, July 1, 2014 to August 17, 2014.

Dated: July 1, 2014.

Perry F. Gayaldo,
Deputy Director, Office of Protected Resources,
National Marine Fisheries Service.

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