

**APPENDIX E**  
**NMFS ENVIRONMENTAL ASSESSMENT AND FONSI**



## NOAA FISHERIES

**PROPOSED ACTION:** Proposed 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, 2015.

**TYPE OF STATEMENT:** Environmental Assessment

**LEAD AGENCY:** U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service

**RESPONSIBLE OFFICIAL:** Donna S. Wieting, Director  
Office of Protected Resources,  
National Marine Fisheries Service

**FOR FURTHER INFORMATION:** Jeannine Cody  
National Marine Fisheries Service  
Office of Protected Resources  
Permits and Conservation Division  
1315 East West Highway  
Silver Spring, MD 20910  
301-427-8401

**LOCATION:** The Northwest Atlantic Ocean, approximately 25 to 85 kilometers (15.5 to 52.8 miles) off the coast of New Jersey.

**ABSTRACT:** This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources proposal to issue an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory, for the taking, by Level B harassment, of marine mammals, incidental to a marine geophysical survey in the Atlantic Ocean, June - August, 2015.

**DATE:** May 2015

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## LIST OF ABBREVIATIONS OR ACRONYMS

ACRC	U.S. Navy’s Atlantic City Range Complex
Authorization	Incidental Harassment Authorization
CFR	Code of Federal Regulations
Commission	Marine Mammal Commission
CZMA	Coastal Zone Management Act (16 U.S.C. §§ 1451 <i>et seq.</i> )
dB	decibel
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973 (16 U.S.C. 1531 <i>et seq.</i> )
EZ	exclusion zone
FONSI	Finding of No Significant Impact
FR	<i>Federal Register</i>
ft	feet
Hz	hertz
IHA	Incidental Harassment Authorization
ITA	Incidental Take Authorization
ITS	Incidental Take Statement
kHz	kilohertz
km	kilometer
km <sup>2</sup>	square kilometer
m	meter
mi	mile
mi <sup>2</sup>	square mile
MMPA	Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1631 <i>et seq.</i> )
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
μPa	micropascal
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act of 1969 (42 U.S.C. 4321 <i>et seq.</i> )
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NSF	National Science Foundation
OMB	Office of Management and Budget
Opinion	Biological Opinion
UME	Unusual Mortality Event
USFWS	U.S. Fish and Wildlife Service

## CHAPTER 1 – INTRODUCTION AND PURPOSE AND NEED

### 1.1 DESCRIPTION OF PROPOSED ACTION

The Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 *et seq.*) generally prohibits the incidental taking of marine mammals. The MMPA defines take as “...to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal...”; and further defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) 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).

There are exceptions, however, to the MMPA’s prohibition on take. The National Marine Fisheries Service, Office of Protected Resources (NMFS, hereinafter, we) may authorize the incidental but not intentional taking of marine mammals by harassment upon the request of a U.S. citizen provided NMFS follows certain statutory and regulatory procedures and make determinations. We discuss this exception in more detail in section 1.2.

Lamont-Doherty Earth Observatory of Columbia University (Lamont-Doherty) has requested an Incidental Harassment Authorization (Authorization) to take marine mammals, by harassment incidental to conducting a marine geophysical (seismic) survey in the Atlantic Ocean off the coast of New Jersey. In response to Lamont-Doherty’s request, NMFS proposes to issue an Incidental Harassment Authorization (Authorization) to Lamont-Doherty under Section 101(a)(5)(D) of the MMPA, which would allow Lamont-Doherty to take marine mammals, incidental to the conduct of a marine geophysical (seismic) survey in federal waters in the northwest Atlantic Ocean approximately 25 to 85 kilometers (km) (15.5 to 52.8 miles [mi]) offshore New Jersey, June through August, 2015. NMFS does not have the authority to permit, authorize, or prohibit Lamont-Doherty’s research seismic activities under Section 101(a)(5)(D) of the MMPA, as that authority lies with the National Science Foundation (NSF).

NMFS’ proposed issuance of an Authorization to Lamont-Doherty is a major federal action under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*), the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, NMFS is required to analyze the effects of our proposed action on the human environment.

This Environmental Assessment (EA) addresses the potential environmental impacts of the following choices available to us under section 101(a)(5)(D) of the MMPA, namely:

- Issue the proposed Authorization<sup>1</sup> to Lamont-Doherty 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;
- Do not issue the proposed Authorization to Lamont-Doherty, in which case, the survey activities would not proceed<sup>2</sup>;

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<sup>1</sup> NMFS may issue an Authorization 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.

<sup>2</sup> NMFS would not issue an Authorization if it cannot make certain findings.

- Issue the proposed Authorization to Lamont-Doherty for take, by Level B harassment, of marine mammals during the seismic survey by incorporating additional required mitigation measures in addition to Lamont-Doherty's or our proposed mitigation and monitoring measures; or
- Do not issue the proposed Authorization to Lamont-Doherty, in which case, NMFS assumes that the survey activities would proceed and cause incidental take without the mitigation and monitoring measures prescribed in the Authorization<sup>3</sup>.

### 1.1.1 BACKGROUND ON LAMONT-DOHERTY'S MMPA APPLICATION

Lamont-Doherty proposes to use the R/V *Marcus G. Langseth* (*Langseth*) to track the geologic record of sea-level changes from the time of the last Ice Age to as far back as 60 million years ago and understand how these changes have caused the New Jersey coastline to advance and retreat. The three-dimensional (3-D) seismic reflection survey would make acoustic images of sediment layers below the seafloor using seismic airguns the sound source to investigate the sediments beneath the Jersey coast, which contain a long record of shoreline response to the earth's natural cycles.

NSF, which owns and operates the *Langseth* under a cooperative agreement with Lamont-Doherty, supports basic scientific research in the mathematical, physical, medical, biological, social, and other sciences pursuant to the National Science Foundation Act of 1950, as amended (NSF Act; 42 U.S.C. 1861-75). NSF considers proposals submitted by organizations and makes contracts and/or other arrangements (*i.e.*, grants, loans, and other forms of assistance) to support research activities. A Foundation-expert panel recommended a research proposal titled, *Collaborative Research: Community-Based 3D Imaging That Ties Clinoform Geometry to Facies Successions and Neogene Sea-Level Change* ([NSF Award #1260237](#)) for funding and ship time on the *Langseth*. As the federal action agency for this award, NSF has funded the proposed seismic survey in the Atlantic Ocean, June through August, 2015 as a part of the NSF Act of 1950.

Acoustic stimuli generated by the seismic airgun array have the potential to cause behavioral disturbances to marine mammals in the proposed project area. We describe the NSF-supported seismic survey in more detail in section 2.2.

### 1.1.2 MARINE MAMMALS IN THE ACTION AREA

There are 37 marine mammal species with confirmed or potential occurrence off the coast of New Jersey, Tables 1(a), 1(b), and 1(c) in this section. Of the 37 species listed in these tables, 32 species would most likely to be harassed incidental to conducting the seismic survey (See Table 6, Section 3.2.1 Affected Environment, Marine Mammals).

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<sup>3</sup> NSF's draft amended EA (NSF, 2014a) states that Lamont-Doherty would not conduct the proposed survey without an Authorization under the MMPA. NMFS presents this alternative for the purposes of NEPA analyses only to show the effect of an MMPA Authorization's requirements,

**Table 1(a)** – Mysticetes with possible/confirmed occurrence in the proposed activity area.

Mysticetes		
1	North Atlantic right whale*	<i>Eubalaena glacialis</i>
2	Humpback whale*	<i>Megaptera novaeangliae</i>
3	Common minke whale	<i>Balaenoptera acutorostrata</i>
4	Sei whale*	<i>Balaenoptera borealis</i>
5	Fin whale*	<i>Balaenoptera physalus</i>
6	Blue whale*	<i>Balaenoptera musculus</i>

**Table 1(b)** – Odontocetes with possible/confirmed occurrence in the proposed activity area.

Odontocetes		
1	Sperm whale*	<i>Physeter macrocephalus</i>
2	Dwarf sperm whale	<i>Kogia sima</i>
3	Pygmy sperm whale	<i>K. breviceps</i>
4	Blainville's beaked whale	<i>Mesoplodon densirostris</i>
5	Cuvier's beaked whale	<i>Ziphius cavirostris</i>
6	Gervais' beaked whale	<i>M. europaeus</i>
7	Sowerby's beaked whale	<i>M. bidens</i>
8	True's beaked whale	<i>M. mirus</i>
9	Northern bottlenose whale	<i>Hyperoodon ampullatus</i>
10	Rough-toothed dolphin	<i>Steno bredanensis</i>
11	Bottlenose dolphin	<i>Tursiops truncatus</i>
12	Pantropical spotted dolphin	<i>Stenella attenuate</i>
13	Atlantic spotted dolphin	<i>S. frontalis</i>
14	Spinner dolphin	<i>S. longirostris</i>
15	Striped dolphin	<i>S. coeruleoalba</i>
16	Short-beaked common dolphin	<i>Delphinus delphis</i>
17	White-beaked dolphin	<i>Lagenorhynchus albirostris</i>
18	Atlantic white-sided-dolphin	<i>L. acutus</i>
19	Risso's dolphin	<i>Grampus griseus</i>
20	Clymene dolphin	<i>Stenella clymene</i>
21	Fraser's dolphin	<i>Lagenodelphis hosei</i>
22	Melon-headed whale	<i>Peponocephala electra</i>
23	False killer whale	<i>Pseudorca crassidens</i>
24	Pygmy killer whale	<i>Feresa attenuate</i>
25	Killer whale	<i>Orcinus orca</i>
26	Long-finned pilot whale	<i>Globicephala melas</i>
27	Short-finned pilot whale	<i>G. macrorhynchus</i>
28	Harbor porpoise	<i>Phocoena phocoena</i>

**Table 1(c)** – Pinnipeds with possible/confirmed occurrence in the proposed activity area.

Pinnipeds		
1	Gray seal	<i>Halichoerus grypus</i>
2	Harbor seal	<i>Phoca vitulina</i>
3	Harp seal	<i>Pagophilus groenlandicus</i>

\* Listed as threatened or endangered under the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*).



### 1.1.3 SPECIES NOT CONSIDERED DUE TO RARITY IN THE ACTION AREA

NMFS does not consider the following species in this EA because their range does not overlap with the proposed survey area or the species are so rarely present in the proposed survey area (LGL, 2014; NSF, 2014c). Therefore, take is unlikely for the species shown in Table 2.

**Table 2** – Species with rare occurrence in the proposed activity area.

Species Not Considered Further in this EA		
1	Beluga whale	<i>Delphinapterus leucas</i>
2	Hooded seal	<i>Cystophora cristata</i>
3	Bryde’s whale	<i>Balaenoptera brydei</i>
4	West Indian manatee <sup>1</sup>	<i>Trichechus manatus</i>

<sup>1</sup> This species is under the jurisdiction of the U.S. Fish and Wildlife Service.

## 1.2 PURPOSE AND NEED

The MMPA prohibits “takes” of marine mammals with only a few specific exceptions. The applicable exception in this case is an authorization for incidental take of marine mammals in section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical 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.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR § 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for authorizations. All applicants must comply with the regulations at 50 CFR § 216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

**Purpose:** The primary purpose of NMFS’ proposed action is to authorize the take of marine mammals incidental to Lamont-Doherty’s proposed seismic survey. The Authorization would exempt Lamont-Doherty from the take prohibitions contained in the MMPA.

To authorize the take of marine mammals incidental to a specified activity under the MMPA, NMFS must evaluate the best available information to determine whether the take would have a negligible impact on marine mammal species or stock and have an unmitigable impact on the availability of affected marine mammal species for certain subsistence uses.

In addition, NMFS must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat (*i.e.*, mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance.

If appropriate and where relevant, NMFS must also prescribe the means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence

uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking.

**Need:** On December 29, 2014, Lamont-Doherty submitted an adequate and complete application demonstrating both the need and potential eligibility for issuance of an Authorization in connection with the activities described in section 1.1.1. NMFS now has a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in Lamont-Doherty’s application (LGL, 2014) and NSF’s draft amended EA titled, *Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer 2015 (NSF, 2014a)*. NMFS’ responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency’s statutory and regulatory requirements. NMFS’ described purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects.

### **1.3 THE ENVIRONMENTAL REVIEW PROCESS**

NEPA compliance is necessary for all “major” federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities fully or partially funded, regulated, conducted, authorized, or approved by a federal agency. Because our issuance of an Authorization would allow for the taking of marine mammals consistent with provisions under the MMPA, NMFS considers this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6 section 6.03(f)(2)(b) for incidental harassment authorizations, NMFS prepared this EA to determine whether the direct, indirect and cumulative impacts related to the proposed issuance of an Authorization for incidental take of marine mammals during the conduct of Lamont-Doherty’s seismic survey activities could be significant. If NMFS deems the potential impacts to be not significant, this analysis, in combination with other analyses incorporated by reference, may support the issuance of a Finding of No Significant Impact (FONSI) for the proposed Authorization.

#### **1.3.1 LAWS, REGULATIONS, OR OTHER NEPA ANALYSES INFLUENCING THE EA’S SCOPE**

NMFS has based the scope of the proposed action and nature of the four alternatives considered in this EA on the relevant requirements in section 101(a)(5)(D) of the MMPA and our related purpose and need. Thus, our authority under the MMPA bounds the scope of our alternatives. This analysis—combined with the analyses in the following documents—fully describes the potential impacts associated with the proposed seismic survey program, including any required mitigation and monitoring measures for marine mammals.

After conducting a review of the information and analyses for sufficiency and adequacy, NMFS incorporates by reference the relevant analyses on Lamont-Doherty’s proposed action as well as a discussion of the affected environment and environmental consequences within the following documents per 40 CFR 1502.21 and NAO 216-6 § 5.09(d):

- NMFS’ notice of the proposed Authorization in the *Federal Register* ([80 FR 13961, March 17, 2015](#));

- [Request for an Incidental Harassment Authorization to Allow the Incidental Take of Marine Mammals during a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer, 2015](#) (LGL, 2014);
- [Final Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, June–July 2014](#) (NSF, 2014c);
- [Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer 2015](#) (NSF, 2014a);
- [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](#) (NSF, 2011); and
- [Record of Decision for Marine Seismic Research Funded by the National Science Foundation. June, 2012](#) (NSF, 2012).

### **MMPA APPLICATION AND NOTICE OF THE PROPOSED IHA**

The CEQ regulations (40 CFR § 1502.25) encourage federal agencies to integrate NEPA’s environmental review process with other environmental review laws. NMFS relies substantially on the public process for developing proposed Authorizations and evaluating relevant environmental information and provide a meaningful opportunity for public participation as we develop corresponding EAs. We fully consider public comments received in response to our publication of the notice of proposed Authorization during the corresponding NEPA review process.

On March 17, 2015, NMFS published a notice of a proposed Authorization in the *Federal Register* ([80 FR 13961, March 17, 2015](#)) which included the following:

- A detailed description of the proposed action and an assessment of the potential impacts on marine mammals and their habitat;
- Proposed mitigation and monitoring measures to avoid and minimize potential adverse impacts to affected marine mammal species or stocks and their habitat and proposed reporting requirements; and
- Our preliminary findings under the MMPA.

NMFS considered Lamont-Doherty’s proposed seismic survey and associated mitigation and monitoring measures and preliminarily determined that the proposed 3-D seismic survey in the Atlantic Ocean, from June through August 2015, would have a negligible impact on the affected species or stocks of marine mammals, resulting at worst in a modification in behavior and/or low-level physiological effects (Level B harassment). In addition, NMFS preliminarily determined that the activity would not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses. The notice afforded the public a 30-day comment period on our proposed MMPA Authorization, including the proposed mitigation, monitoring, and reporting requirements.

### **1.3.2 SCOPE OF ENVIRONMENTAL ANALYSIS**

Given the limited scope of the decision for which NMFS is responsible, this EA intends to provide more focused information on the primary issues and impacts of environmental concern

related specifically to the proposed issuance of the Authorization. This EA does not further evaluate effects to the elements of the human environment listed in Table 3 because previous environmental reviews for Lamont-Doherty’s seismic survey, incorporated by reference (NSF, 2011, 2014a, 2014c), have evaluated the effects of these activities on other elements of the human environment.

NSF’s draft amended EA for this activity (NSF, 2014a) which tiers off of a final EA for this activity (NSF, 2014c); their *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* (hereafter referred as the PEIS, NSF, 2011); and Record of Decision (NSF, 2012) concluded that the impact of the action:

- would have minor and transitory effects on the marine environment or marine resources;
- would not significantly impact marine invertebrate populations, recreational and commercial fisheries, seabirds, and associated Essential Fish Habitat;
- would not significantly impact archaeological and traditional cultural resources; and
- would not significantly impact recreational dive sites and shipwrecks.

**Table 3** – Components of the human environment not affected by our issuance of an Authorization.

<b>Biological</b>	<b>Physical</b>	<b>Socioeconomic / Cultural</b>
Amphibians	Air Quality	Commercial Fishing
Humans	Essential Fish Habitat	Military Activities
Non-Indigenous Species	Geography	Oil and Gas Activities
Seabirds	Land Use	Recreational Fishing
	Oceanography	Shipping and Boating
	State Marine Protected Areas	Recreational Diving
	Federal Marine Protected Areas	National Historic Preservation Sites
	National Estuarine Research Reserves	National Trails and Nationwide Inventory of Rivers
	National Marine Sanctuaries	Low Income Populations
	Park Land	Minority Populations
	Prime Farmlands	Indigenous Cultural Resources
	Wetlands	Public Health and Safety
	Wild and Scenic Rivers	Historic and Cultural Resources
	Ecologically Critical Areas	

In addition, previous environmental reviews for similar Authorizations for seismic survey activities in the Atlantic Ocean, incorporated by reference, have shown that NMFS’ action would not affect those components of the human environment listed in Table 3. They include:

- *Environmental Assessment for the 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 Atlantic Ocean, April - June, 2013* (NMFS, 2013a);
- *Environmental Assessment: 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 Northeast Atlantic Ocean, June to July 2013* (NMFS, 2013b); and

- *Environmental Assessment on the 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* (NMFS, 2014b).

In each case, NMFS concluded that the proposed issuance of an Authorization for each seismic survey would not significantly affect the quality of the human environment and issued findings of no significant impact (FONSI).

### **1.3.3 NEPA PUBLIC SCOPING SUMMARY**

NAO 216-6 established agency procedures for complying with NEPA and the implementing NEPA regulations issued by the CEQ. Consistent with the intent of NEPA and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, NMFS requested comments on the potential environmental impacts described in Lamont-Doherty's MMPA application and in the *Federal Register* notice of the proposed Authorization ([80 FR 13961, March 17, 2015](#)). The CEQ regulations further encourage agencies to integrate the NEPA review process with review under the environmental statutes. Consistent with agency practice NMFS integrated our NEPA review and preparation of this EA with the public process required by the MMPA for the proposed issuance of an Authorization.

The *Federal Register* notice of the proposed Authorization, combined with our preliminary determinations, supporting analyses, and corresponding public comment periods are instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments to us for consideration in both the MMPA and NEPA decision-making processes.

The *Federal Register* notice of the proposed Authorization summarized NMFS' proposed action and any potential impacts to marine mammals and their habitat, and included a statement that we would evaluate NSF's draft amended EA (NSF, 2014a) and determine whether or not to adopt it or prepare a separate NEPA analysis and incorporate relevant portions of NSF's draft amended EA by reference. NMFS invited interested parties to submit written comments concerning the application and our preliminary analyses and findings including those relevant to consideration in the draft EA. The public comment period for the notice of the proposed Authorization began on March 17, 2015 and ended on April 16, 2015. The NSF will finalize their amended EA at the conclusion of environmental reviews conducted under various statutes, including the MMPA and ESA.

We posted Lamont-Doherty's application on our [website](#) concurrently with the release of the *Federal Register* notice of the proposed Authorization. We base this EA on the information included in our *Federal Register* notice, the documents it references, and the public comments provided in response. At the conclusion of this process, we will post the final EA, and, if appropriate, FONSI, on the same website.

### 1.3.4 RELEVANT COMMENTS ON OUR *FEDERAL REGISTER* NOTICE

During the 30-day public comment period on the notice of the proposed Authorization, we received comment letters from the following:

**Table 4a** – Members of the U.S. Congress who submitted comments on our proposed action.

Congressional	
Representative Tom MacArthur	Senator Cory Booker

**Table 4b** – Federal or state agencies who submitted comments on our proposed action.

Federal / State Agencies	
U.S. Marine Mammal Commission	NJ Department of Environmental Protection

**Table 4c** – Organizations and individuals who submitted comments on our proposed action.

Organizations and Private Citizens	
Anonymous (1)	Kathleen Maher
Dr. Nathan Bangs	Edward G. Mitchell
Tracy Basile	Marcus Langseth Science Oversight Committee
John Bell	NJ Marine Fisheries Council
Dr. Jonathan R. Childs	New York Whale and Dolphin Action League
Clean Ocean Action	Dr. Terry L. Pavlis
Dr. Ronald Clowes	Dr. Mary Jo Richardson
Dr. Sean Gulick	Sally Shore
Dr. Wilford D. Gardner	SandyHook SeaLife Foundation
Dr. Marsha Green	Dr. Dale Sawyer
Joan Fitzsimmons	Dr. David Scholl
Amy Harlib	Denise Sprague
Charles and Kathleen Hansen	Imogen Taylor
Dr. Lincoln S. Hollister	Donald Widmyer
James H. Knapp	Mary C. Wilding
Dr. Mitch Lyle	

The substantive public comments related to the potential environmental impacts associated with NMFS’ action of issuing an Authorization for Lamont-Doherty’s action include:

- Re-evaluating our preliminary determinations for impacts on marine mammals;
- Providing justification that our determination that Level A harassment would not occur during the conduct of the seismic survey is based on the best available science;
- Considering and incorporating the latest information on species present in the area;
- Consideration of additional mitigation measures such as establishing larger exclusion zones; lowering the acoustic thresholds for take estimates; suspending activities at night; conducting the survey at an alternative time; and using additional methods to detect marine mammals;
- Ensuring consideration of cumulative effects of other anthropogenic sound producing activities in the action area, including future seismic exploration activities and the use of active acoustic sources; and
- Evaluating the impacts to North Atlantic right whales and bottlenose dolphins.

The Marine Mammal Commission (Commission) provides comments on all proposed incidental take authorizations as part of their established role under the MMPA (§ 202 (a)(2)). The Commission submitted the following recommendations:

- Require Lamont-Doherty to take in-situ measurements at the survey location to verify, refine, and if needed, recalculate exclusion zone estimates;
- Require Lamont-Doherty to revise their take estimates; and
- Consult with the NSF and Lamont-Doherty 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.

NMFS fully considered all of the public comments, including any pertinent and substantive information, as part of our MMPA and NEPA decision-making process and crafted our final Authorization and this EA accordingly. We have also provided responses to the public comments in the *Federal Register* notice announcing our issuance of the Authorization.

Where appropriate, we have modified the proposed Authorization based on public comments. Modifications include:

- Revising the take estimates in response to the Commission’s comments to account for enumerating takes within a small area over the entire duration of the survey.
- NMFS reviewed the preliminary analysis of in-situ source data collected in 2014 at the same survey site (Crone, 2015) to confirm the accuracy of Lamont-Doherty’s modeled exclusion zones. The preliminary data demonstrated that the mitigation radii proposed for use in the survey were conservative and precautionary..

#### **1.4 OTHER PERMITS, LICENSES, OR CONSULTATION REQUIREMENTS**

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action. NMFS incorporates those descriptions by reference in this EA and briefly summarize them in this section.

##### **1.4.1 ENDANGERED SPECIES ACT**

Section 7 of the ESA and implementing regulations at 50 CFR § 402 require federal agencies to consult with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that “may affect” a listed species or critical habitat. Accordingly, the ESA requires federal agencies to ensure that the proposed action would not likely jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species. There are six marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area: blue, fin, humpback, North Atlantic right, sei, and sperm whales.

Under section 7 of the ESA, the Foundation, the lead Federal agency which owns and operates the *Langseth*, initiated formal consultation on their action with the National Marine Fisheries Service, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division. The NSF requested authorization for the incidental take of four species of marine mammals listed as endangered under the ESA under NMFS’ jurisdiction: fin, humpback, sei, and sperm whales.

NMFS' proposed issuance of an Authorization is also a federal action also subject to the section 7 ESA consultation requirements. For the proposed survey, NMFS requested authorization for two additional species of marine mammals listed as endangered under the ESA under NMFS' jurisdiction: North Atlantic right and blue whales. There is no designated critical habitat for any of the ESA-listed species within the action area; thus, our proposed Authorization would not affect any of these species' critical habitats.

The formal consultation under section 7 of the ESA will conclude with a single Biological Opinion for NSF's Division of Ocean Sciences and NMFS' Office of Protected Resources, Permits and Conservation Division for the seismic survey and proposed Authorization under the MMPA.

#### **1.4.2 MARINE MAMMAL PROTECTION ACT**

We discuss the MMPA and its provisions that pertain to the proposed action described within section 1.2.

#### **1.4.3 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT**

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA; 16 U.S.C. 1801 *et seq.*), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA.

Table 4 (page 30) of NSF's draft amended EA (NSF, 2014a) identifies marine species with EFH overlapping the proposed survey area. As the federal action agency funding Lamont-Doherty's activities, the NSF completed consultation with the NMFS Greater Atlantic Regional Office on EFH on February 11, 2015.

NMFS determined that mitigation and monitoring measures required by the proposed Authorization for the action would not result in adverse effects to EFH. Thus, the proposed issuance of an Authorization for the taking of marine mammals, incidental to Lamont-Doherty's seismic survey would not impact EFH and would not require an EFH consultation.

#### **1.4.4 COASTAL ZONE MANAGEMENT ACT**

Congress enacted the Coastal Zone Management Act (CZMA) (16 U.S.C. §§ 1451 *et seq.*) to encourage coastal and Great Lakes states and territories to develop NOAA-approved comprehensive state management programs. These programs work to conserve and manage coastal resources and uses and make decisions designed to balance the competing demands placed on these uses and resources. An incentive to join the National Coastal Zone Management Program is the federal consistency provision, which gives states a voice in all federal activities that may impact a state's coastal uses or resources.

Once state coastal management programs and the policies within them receive federal approval from NOAA, federal agencies that undertake activities that may have reasonably foreseeable effects on coastal uses or resources are required to be consistent to the maximum extent practicable with those enforceable policies.



Where a federal agency is conducting a project, as is the case with the NSF, the agency is obligated to provide an affected coastal state with a consistency determination analyzing the reasonably foreseeable effects of the project and its consistency with the enforceable policies of the state. In such instances, the review by the state is of the project not any authorizations which are incidental to the federally conducted project.

The NSF submitted a consistency determination to the State of New Jersey for the proposed survey. Although the state issued a CZMA objection to the survey project, this has no bearing on NMFS' review of the application by NSF for an Authorization which is not subject to state review. NSF may proceed over the objection of the state if it determines that the project meets the CZMA standard of consistent to the maximum extent practicable.

## CHAPTER 2 – ALTERNATIVES

### 2.1 INTRODUCTION

The NEPA and the implementing CEQ regulations (40 CFR §§ 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.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, and as we previously explained, 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 this EA.

Alternatives 1 and 3 include a suite of mitigation measures intended to minimize any potential adverse effects to marine mammals. This chapter describes both alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

### 2.2 DESCRIPTION OF THE OBSERVATORY'S PROPOSED ACTIVITIES

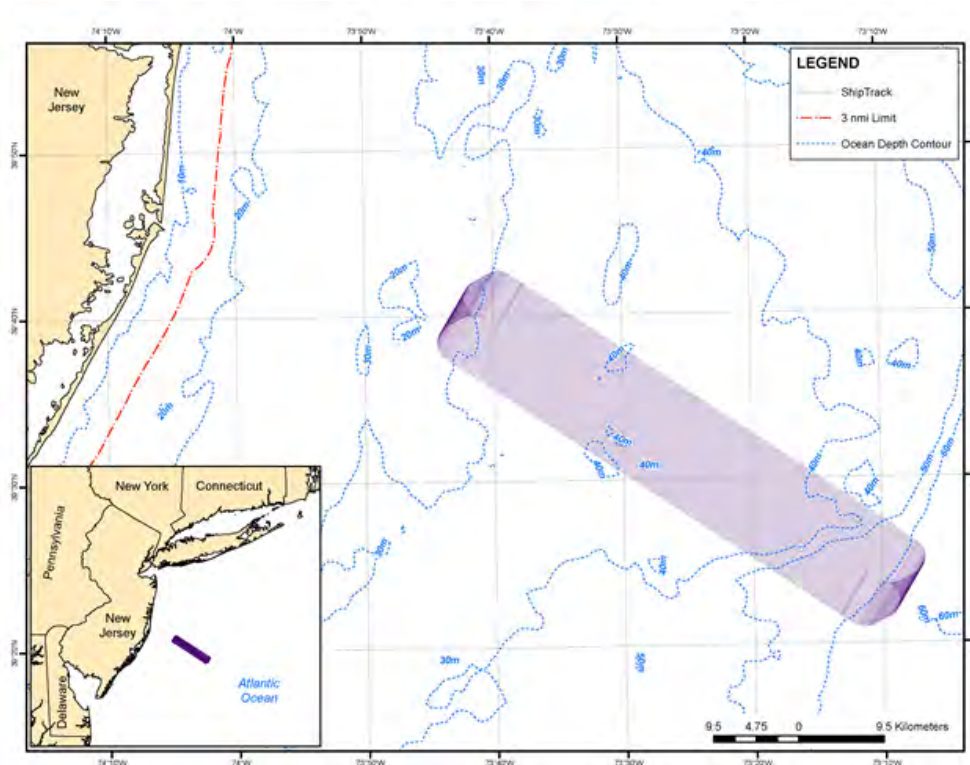
We presented a general overview of the Observatory's proposed 3-D seismic survey operations in our *Federal Register* notice of the proposed Authorization ([80 FR 13961, March 17, 2015](#)). Also, Lamont-Doherty's application (LGL, 2014) and NSF's draft amended EA (NSF, 2014a), describe the survey protocols in detail. We incorporate those descriptions by reference in this EA and briefly summarize them here.

#### 2.2.1 SPECIFIED TIME AND SPECIFIED AREA

Lamont-Doherty proposes to conduct the seismic survey from the period of June 1 through August 31, 2015. The proposed 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). Lamont-Doherty would not conduct the proposed survey after August 31, 2014 to avoid exposing North Atlantic right whales to sound at the during their migration season.

Lamont-Doherty 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 (Figure 1). Water depths in the survey area are approximately 30 to 75 meters (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.

**Figure 1** – Proposed location of the seismic survey in the Atlantic Ocean off the coast of New Jersey during June through August, 2015.



### 2.2.2 3-D SEISMIC SURVEY OPERATIONS

**Source Vessel:** The *Langseth* is 71.5 m (235 ft) long vessel with a gross tonnage of 3,834 pounds. The vessel’s speed during operations would be approximately 4.5 knots (kt) (8.3 km/hour (hr); 5.1 miles per hour (mph)). It has an observation tower that is 21.5 m (71 ft) above sea level providing protected species observers an unobstructed view around the entire vessel.

**Transit:** The *Langseth* would transit for approximately eight hours to the proposed survey area. Setup, deployment, and streamer ballasting would occur over approximately one day and seismic acquisition would take approximately 30 days. At the conclusion of the proposed survey, the *Langseth* would take approximately one day to retrieve gear and would conclude the survey.

**Transects:** The proposed survey would cover approximately 4,900 km (3,045 mi) of transect lines within a 12 by 50 km (7.5 by 31 mi) area. Each transect line would have a spacing interval of 150 m (492 ft) in two 6-m (19.7-ft) wide race-track patterns.

**Seismic Airguns:** During the survey, the *Langseth* would deploy two pairs of subarrays of four airguns as an energy source. The airguns are a mixture of Bolt 1500LL and Bolt 1900LLX airguns ranging in size from 40 to 220 cubic inches (in<sup>3</sup>), with a firing pressure of 1,950 pounds per square inch. The dominant frequency components range from zero to 188 Hertz (Hz). The nominal source levels of the airgun subarrays on the *Langseth* range from 246 to 253 dB re: 1 μPa (peak-to-peak). The subarrays would fire alternately, with a total volume of approximately 700 cubic inches (in<sup>3</sup>). In this configuration, the source volume would not exceed 700 in<sup>3</sup> (i.e., the four-string subarray) at any time during acquisition. The *Langseth* would tow each subarray at a depth of either 4.5 or 6 m (14.8 or 19.7 ft) resulting in a shot interval of approximately 5.4 seconds (12.5 m; 41 ft). During acquisition the airguns would emit a brief (approximately 0.1 second) pulse of sound. During the intervening periods of operations, the airguns would be silent.

**Hydrophones:** The receiving system would consist of four 3,000-m (1.9-mi) hydrophone streamers with a spacing interval of 75 m (246 ft) between each streamer; a combination of two 3,000-m (1.9-mi) hydrophone streamers, and a P-Cable system. As the *Langseth* tows the airgun subarrays along the survey lines, the hydrophone streamers would receive the returning acoustic signals and transfer the data to the on-board processing system.

**Multibeam Echosounder:** The *Langseth* would operate a Kongsberg EM 122 multibeam echosounder concurrently during airgun operations to map characteristics of the ocean floor. The *Langseth* would not operate the multibeam echosounder during transits to and from the survey area, (*i.e.*, when the airguns are not operating). The hull-mounted echosounder emits brief pulses of sound (also called a ping) (10.5 to 13.0 kilohertz (kHz)) in a fan-shaped beam that extends downward and to the sides of the ship. The nominal source level for the multibeam echosounder is 242 dB re: 1  $\mu$ Pa.

**Sub-bottom Profiler:** The *Langseth* would also operate a Knudsen Chirp 3260 sub-bottom profiler concurrently during airgun and echosounder operations to provide information about the sedimentary features and bottom topography. The *Langseth* would not operate sub-bottom profiler during transits to and from the survey area, (*i.e.*, when the airguns are not operating). The hull-mounted profiler emits a ping with a dominant frequency component at 3.5 kHz. The nominal source level for the profiler is 204 dB re: 1  $\mu$ Pa.

**Support Vessel:** Lamont-Doherty would use a support vessel to prevent the *Langseth's* streamer entangling with fixed fishing gear. The vessel would be a multi-purpose offshore utility vessel similar to the *Northstar Commander*, which is 28 m (91.9 ft) long with a beam of 8 m (26.2 ft) and a draft of 2.6 m (8.5 ft).

**Ballast Water Requirements:** The proposed seismic research would not result in discharges of any pollutants or non-indigenous species or into ocean waters. The operation of the *Langseth* would only result in discharges incidental to normal operations of a surface vessel (NSF, 2011).

### 2.2.3 APPROACH TO DEVELOPING MITIGATION EXCLUSION ZONES

Lamont-Doherty's application (LGL, 2014), Appendix A in the Foundation's draft amended EA (NSF, 2014a), and Section 2.2.2 in NMFS 2014 EA (NMFS, 2014b) describe the approach to establishing mitigation exclusion zones in detail. We incorporate those descriptions by reference in this EA and briefly summarize them here.

In summary, Lamont-Doherty acquired sound propagation 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, Lamont-Doherty developed a sound propagation modeling approach<sup>4</sup> that conservatively predicts received sound levels as a function of distance from a particular airgun array configuration in deep water (Crone, 2015; Crone et al., 2014; Diebold et al., 2010).

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<sup>4</sup> The modeling approach uses ray tracing (*i.e.*, a graphical representation of the effects of refracting sound waves) for the direct wave traveling from the array to the receiver and its associated source ghost (reflection at the air-water interface in the vicinity of the array), in a constant-velocity half-space (infinite homogeneous ocean layer, unbounded by a seafloor).

To estimate the proposed exclusion and buffer zones for the survey off New Jersey, Lamont-Doherty used extrapolations and scaling factors. In summary, they obtained propagation measurements in shallow water of the Gulf of Mexico for the Langseth's 3,300-in<sup>3</sup> array towed at 6 m depth, in both cross-line (athwartship) and in-line (foreward and aft) directions. They used a 95<sup>th</sup> percentile fit to the cross-line measurements (obtained at ranges approximately 2–14.5 km from the source) to extrapolate the near-field measurements at less than 2 km and far-field measurements at more than 14.5 km. The cross-line measurements and extrapolations were more conservative than the in-line measurements and extrapolations. Lamont-Doherty used this information to derive the mitigation radii for the proposed survey off New Jersey. Lamont-Doherty accounted for the differences in array volumes, airgun configurations, and tow depths between the Gulf of Mexico and New Jersey surveys by various scaling factors calculated based on the radii obtained from the modeling approach for deep water.

Lamont-Doherty 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. Lamont-Doherty conducted the shallow-water survey using an airgun configuration that was approximately 78 percent larger than the total discharge volumes proposed for this shallow-water survey (*i.e.*, 6,600 in<sup>3</sup>) compared to 700 in<sup>3</sup> and recorded the received sound levels on the shelf and slope off Washington using the Langseth's 8-km hydrophone streamer. Crone et al. (Crone, et al., 2014; 2013) analyzed those received sound levels from the 2012 survey and reported that the actual distances for the exclusion and buffer zones were smaller than what Lamont-Doherty's modeling approach predicted.

In 2010 and 2014, Lamont-Doherty 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 (Crone, 2015; Crone, et al., 2014). They reported that the observed sound levels from the field measurements fell almost entirely below the predicted mitigation radii curve (Crone, 2015; Crone, et al., 2014). Based on this information, Lamont-Doherty has shown that their model can reliably estimate mitigation radii in deep water. We acknowledge that Lamont-Doherty 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. While the results confirm bathymetry's role in sound propagation, Crone *et al.* (Crone, et al., 2014; 2013) were able to confirm that the empirical measurements from the Gulf of Mexico calibration survey (the same measurements used to inform Lamont-Doherty'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 the 2015 proposed survey offshore New Jersey, Lamont-Doherty conducted a retrospective sound power analysis and model validation of one of the lines (a 700-in<sup>3</sup> source towed at 4.5 m depth and shot upslope in water depths ranging from approximately 50 to 20 m) acquired during Lamont-Doherty's seismic survey offshore New Jersey in 2014 to verify the accuracy of its acoustic modeling approach for estimating exclusion and buffer zones (Crone, 2015). Lamont-Doherty used a regression model to fit the collected data 500 m to 3.5 km in line from the source and used a 95th percentile fit to the regression model for all shots along the line. Comparison of the preliminary results showed that the 95th percentile cross-line predicted means of 273 m (896 ft) for the 180-dB re 1  $\mu$ Pa threshold was approximately 28 percent smaller than the model predicted radii of 378 m (1,240 ft). Likewise, the 95th percentile cross-line predicted means of

3,505 m (2.1 mi) for the 160-dB re 1  $\mu$ Pa threshold was approximately 33 percent smaller than the model predicted radii of 5,240 m (3.2 mi).

In summary, Lamont-Doherty 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. NMFS believes that this is a rational method for using the best available information to estimate the proposed exclusion and safety zones (Table 5).

**Table 5** – Modeled exclusion zones (EZ) for marine mammals in the survey area.

Source and Volume (in <sup>3</sup> )	Tow Depth (m)	Water Depth (m)	Predicted RMS Distances (m) <sup>1</sup>		
			190 dB <sup>2</sup>	180 dB	160 dB
Single Bolt airgun (40 in <sup>3</sup> )	6	< 100	21	73	995
4-Airgun subarray (700 in <sup>3</sup> )	4.5	<100	101	378	5,240
4-Airgun subarray (700 in <sup>3</sup> )	6	<100	118	439	6,100

<sup>1</sup> Predicted distances for 160 dB based on information in Table 1 of the Foundation’s application.

<sup>2</sup> The Observatory did not request take for pinniped species in their application and consequently did not include distances for the 190-dB isopleth for pinnipeds in Table 1 of their application. Because NMFS anticipates that pinnipeds have the potential to occur in the survey area, Lamont-Doherty calculated the distances for the 190-dB isopleth and submitted them to NMFS on for inclusion in this table.

## 2.3 DESCRIPTION OF ALTERNATIVES

### 2.3.1 ALTERNATIVE 1 – ISSUANCE OF AN AUTHORIZATION WITH MITIGATION MEASURES

The Proposed Action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue an Authorization (valid from June through August 2015) to Lamont-Doherty allowing the incidental take, by Level B harassment, of marine mammals subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed Authorization, subject to changes based on consideration of public comments.

#### MITIGATION MEASURES

As described in Section 1.2, NMFS must prescribe the means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider Lamont-Doherty’s proposed mitigation measures, as well as other potential measures. NMFS’ evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any additional mitigation measure proposed by NMFS beyond what the applicant proposes should be able to or have a reasonable likelihood of accomplishing or contributing to the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death wherever possible;

- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at biologically important time or location);
- 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; and
- For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

To reduce the potential for disturbance from acoustic stimuli associated with the activities, Lamont-Doherty has agreed to implement the following monitoring and mitigation measures for marine mammals. These include:

- 1) Establish a 180 dB re: 1  $\mu$ Pa and 190 dB re: 1  $\mu$ Pa exclusion zone (EZ) for marine mammals before the full array (*i.e.*, 700 in<sup>3</sup>) or a single airgun (*i.e.*, 40 in<sup>3</sup>) is in operation (Table 5).
- 2) Utilize NMFS-qualified, vessel-based Protected Species Observers (PSOs) to visually watch for and monitor marine mammals near the seismic source vessel during daytime operations (from nautical twilight-dawn to nautical twilight-dusk) and before and during start-ups of sound sources day or night. Two PSOs would observe the exclusion and disturbance zones. When practicable, as an additional means of visual observation, the *Langseth's* vessel crew may also assist in detecting marine mammals.
- 3) Visually observe the entire extent of the EZ (180 dB re: 1  $\mu$ Pa for cetaceans and 190 dB re: 1  $\mu$ Pa for pinnipeds) using NMFS-qualified PSOs, for at least 30 minutes (min) prior to starting the airgun array (day or night).
- 4) Implement a ramp-up procedure when initiating the seismic operations or any time after the entire array has been shut down for more than 8 minutes, which means start the smallest sound source first and add sound sources in a sequence such that the source level of the array shall increase in steps not exceeding approximately 6 dB per 5-minute period. During ramp-up, the PSOs would monitor the EZ, and if they sight marine mammals, they would implement a power-down or shutdown as though the full array were operational. Therefore, initiation of ramp-up procedures from shutdown requires that the PSOs visually observe the full EZ described in Measures 1 and 3.
- 5) Power-down or shutdown the sound source(s) if a PSO detects a marine mammal that is within, approaches, or enters the applicable EZ. A shutdown means that the crew shuts down all operating sound sources (*i.e.*, turned off). A power-down means reducing the number of operating sound sources to a single operating 40 in<sup>3</sup> airgun, which reduces the EZ to the degree that the animal(s) is no longer within or about to enter it.
- 6) Set the shot interval for the single operating 40 in<sup>3</sup> airgun to one shot per minute.
- 7) Following a power-down, the *Langseth* crew would not resume full airgun activity until the marine mammal has cleared the 180- or 190-dB exclusion zone. The observers would consider the animal to have cleared the exclusion zone if:

- a. the observer has visually observed the animal leave the exclusion zone; or
  - b. 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).
- 8) Following a power-down, 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).
  - 9) Considering the conservation status of North Atlantic right whales, the *Langseth* crew would be required to shut down 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 a North Atlantic right whale for 30 minutes.
  - 10) Following a shutdown for more than 8 min and subsequent animal departure, survey operations may resume following ramp-up procedures described in Measure 4.
  - 11) The seismic survey may continue into night and low-light hours if such segment(s) of the survey is initiated when the entire applicable EZs can be effectively monitored visually (*i.e.*, PSO(s) must be able to see the extent of the entire applicable EZ).
  - 12) No initiation of survey operations involving the use of sound sources is permitted from a shutdown position at night or during low-light hours (such as in dense fog or heavy rain) unless at least one airgun (40-in<sup>3</sup> 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 EZ would not be visible during those conditions.
  - 13) Alter speed or course during seismic operations if a marine mammal, based on its position and relative motion, appears likely to enter the relevant EZ. If speed or course alteration is not safe or practicable, or if after implementing an alteration the marine mammal still appears likely to enter the EZ, further mitigation measures, such as a power-down or shutdown, shall be taken.
  - 14) Power down the airgun array for concentrations of six or more animals are within the 160-dB buffer zone and avoid concentrations of humpback, sei, fin, blue, and/or sperm whales (if possible (*i.e.*, exposing concentrations of animals to 160 dB re 1  $\mu$ Pa). For purposes of the survey, a concentration or group of whales will consist of six or more individuals visually sighted that do not appear to be traveling (*e.g.*, feeding, socializing, etc.); and
  - 15) Restrict the operation of the multi-beam echosounder, sub-bottom profiler, and acoustic Doppler current profiler during transit.



## MONITORING MEASURES

Lamont-Doherty proposes to sponsor marine mammal monitoring during the present project, in order to implement the mitigation measures that require real-time monitoring and to satisfy the monitoring requirements of section 101(a)(5)(D).

In addition to the PSOs described above, the Authorization would require Lamont-Doherty to use a passive acoustic monitoring (PAM) system, to the maximum extent practicable, to detect, and allow some localization of marine mammals around the *Langseth* during all airgun operations and during most periods when airguns are not operating. When the PAM operator detects an animal, he/she must notify the PSO immediately of a vocalizing marine mammal so the *Langseth* crew can initiate a power-down or shut-down, if required.

## REPORTING MEASURES

Lamont-Doherty would submit a draft report to NMFS and the Foundation within 90 days after the end of the cruise. The report would describe the operations conducted and sightings of marine mammals near the operations. The report would provide full documentation of methods, results, and interpretation pertaining to all monitoring. The report must contain and summarize the following information:

- 1) Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and associated activities during all seismic operations and marine mammal sightings;
- 2) Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as associated seismic activity (number of power-downs and shutdowns), observed throughout all monitoring activities;
- 3) An estimate of the number (by species) of: (A) pinnipeds that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re: 1  $\mu$ Pa and/or 190 dB re: 1  $\mu$ Pa with a discussion of any specific behaviors those individuals exhibited; and (B) cetaceans that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re: 1  $\mu$ Pa and/or 180 dB re: 1  $\mu$ Pa with a discussion of any specific behaviors those individuals exhibited.
- 4) A description of the implementation and effectiveness of the: (A) terms and conditions of the Biological Opinion's Incidental Take Statement (ITS); and (B) mitigation measures required by our Authorization. For the Biological Opinion, the report shall confirm implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness, for minimizing the adverse effects of the action on ESA-listed marine mammals.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the Authorization, such as an injury (Level A harassment), serious injury, or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), Lamont-Doherty would immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the Greater Atlantic Regional Stranding Network Coordinator. Lamont-Doherty may not resume activities until we are able to review the circumstances of the prohibited take. The report must include the following information:

- 1) Time, date, and location (latitude/longitude) of the incident;

- 2) The *Langseth's* speed during and leading up to the incident;
- 3) Description of the incident;
- 4) Status of all sound source use in the 24 hours preceding the incident;
- 5) Water depth;
- 6) Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- 7) A description of marine mammal observations in the 24 hours preceding the incident;
- 8) Species identification or description of the animal(s) involved;
- 9) The fate of the animal(s); and
- 10) Photographs or video footage of the animal (if equipment is available).

In the event that Lamont-Doherty discovers an injured or dead marine mammal, and the PSO 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), Lamont-Doherty would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the Greater Atlantic Regional Stranding Coordinator. The report must include the same information identified in the paragraph above this section. Activities may continue while we review the circumstances of the incident. We would work with Lamont-Doherty to determine whether modifications in the activities are appropriate.

In the event that Lamont-Doherty discovers an injured or dead marine mammal, and the lead PSO 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), Lamont-Doherty would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the and the Greater Atlantic Regional Stranding Coordinator within 24 hours of the discovery. Lamont-Doherty would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. Activities may continue while we review the circumstances of the incident.

#### **TAKE ESTIMATES**

Lamont-Doherty 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  $\mu$ Pa 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 (2,037 km<sup>2</sup> which includes a 25 percent contingency factor to account for repeated tracklines), along with the expected density of animals in the area. Lamont-Doherty 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 (LGL, 2014; NSF, 2014a, 2014c), however, Lamont-Doherty suggested that the 25 percent contingency factor would cover any potential underestimate of individuals.

Based on public comments received on the *Federal Register* notice of proposed Authorization, NMFS re-evaluated and revised the take estimates. Thus, this Preferred Alternative would satisfy the purpose and need of our proposed action under the MMPA—issuance of an Authorization,

along with required mitigation measures and monitoring that meets the standards set forth in section 101(a)(5)(D) of the MMPA and the implementing regulations, based on the best available information.

### **2.3.2 ALTERNATIVE 2 – NO ACTION ALTERNATIVE**

Under the No Action Alternative, NMFS would not issue the Authorization, which would be based on an inability to make one of the findings required by section 101(a)(5)(D) (*i.e.*, negligible impact or small numbers; subsistence impacts are not implicated here). Lamont-Doherty has indicated it would not proceed with their proposed activities absent an Authorization.

### **2.3.3 ALTERNATIVE 3 – NO ACTION / LAMONT-DOHERTY PROCEEDS WITH SURVEY**

Under this Alternative, NMFS would not issue the Authorization, which would be based on an inability to make one of the findings required by section 101(a)(5)(D) (*i.e.*, negligible impact or small numbers; subsistence impacts are not implicated here). Lamont-Doherty could choose to proceed with their proposed activities absent an Authorization. If they chose this option, Lamont-Doherty would not be exempt from the MMPA take prohibitions and would be in violation of the MMPA if take of marine mammals occurs.

For purposes of this EA, NMFS characterizes this Alternative as Lamont-Doherty not receiving an Authorization yet proceeding to conduct the 3-D seismic survey program without the protective measures and reporting requirements required by an Authorization under the MMPA. NMFS takes this approach to meaningfully evaluate the primary environmental issues—the impact on marine mammals from these activities in the absence of protective measures.

### **2.3.4 ALTERNATIVE 4 – ISSUANCE OF AUTHORIZATION WITH ADDITIONAL MITIGATION**

Under Alternative 3, we would issue an Authorization to Lamont-Doherty, allowing the incidental take by Level B harassment only of small numbers of marine mammal species incidental to conducting seismic survey activities in the Atlantic Ocean during the effective period of the Authorization. Alternative 3 would consist of all of the mitigation, monitoring, and reporting measures contained in Alternative 1, including the following additional measures derived from the public comment process on our notice of the proposed Authorization.

- (1) **Alternate Survey Timing:** This measure would require Lamont-Doherty to conduct research after the summer season.
- (2) **Operational Restrictions:** This measure would require Lamont-Doherty to suspend their activities in low-light/nighttime conditions and minimize the number of repeated tracklines for the survey.
- (3) **Augmented Monitoring:** This measure would require the use of alternative technologies and methods (*e.g.*, hydrophone buoys, aerial surveys, shore-based and small-vessel monitoring) to detect marine mammals beyond the proposed visual and acoustic monitoring.

## **2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION**

NMFS considered whether other alternatives could meet the purpose and need and support the Lamont-Doherty's activities. We considered an alternative that would allow for the issuance of an Authorization with no required mitigation or monitoring but eliminated that Alternative from

consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, we do not analyze this alternative further in this document.

## CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter describes existing conditions in the proposed survey area. Descriptions of the physical and biological environment of the action area are contained in the documents incorporated by reference (see section 1.3.1) and summarized here.

### 3.1 PHYSICAL ENVIRONMENT

As discussed in Chapter 1, NMFS' proposed action and alternatives relate only to the proposed issuance of our Authorization of incidental take of marine mammals and not to the physical environment. Certain aspects of the physical environment are not relevant to our proposed action (see section 1.3.2 - Scope of Environmental Analysis). Because of the requirements of NAO 216.6, however, we briefly summarize the physical components of the environment here.

The New Jersey shelf lies between the Hudson and the Delaware shelf valleys from 38°40' to 40°30'N and 72°30' to 74°40'W and covers a 25,000-square kilometer (km<sup>2</sup>) (9,653-square mile (mi<sup>2</sup>)) area. The shelf ranges from 120 to 150 km (75 to 93 mi) in width, sloping to the east and becomes steeper where the shelf break begins at the 120- and 160-m (394- to 525-ft) isobath (Carey et al., 1998). The bottom type of the shelf is categorized as soft, consisting of sandy to muddy-sandy bottom substrate (Navy, 2013).

The water off the U.S. east coast consists of three water masses: coastal or shelf waters, slope waters, and the Gulf Stream. Coastal waters off Canada, which originate mostly in the Labrador Sea, move southward over the continental shelf until they reach Cape Hatteras, where they are entrained between the Gulf Stream and slope waters (NSF, 2014a).

#### 3.1.1 MARINE MAMMAL HABITAT

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in our notice of the proposed Authorization. Also, NSF presented more detailed information on the physical and oceanographic aspects of the New Jersey environment in their draft amended EA (NSF, 2014a) and final EA (NSF, 2014c). In summary, the marine mammals in the survey area use the nearshore, shelf, shelf break, and continental slope waters, but may have differing habitat preferences based on their life history functions (NJDEP, 2010).

### 3.2 BIOLOGICAL ENVIRONMENT

#### 3.2.1 MARINE MAMMALS

We provide information on the occurrence of marine mammals with possible or confirmed occurrence in the survey area in section 1.1.2 of this EA (Tables 1a, b, and c). The marine mammals most likely to be present in the action area are in Table 6.

The *Federal Register* notice of the proposed Authorization ([80 FR 13961, March 17, 2015](#)) provided information on the stock, regulatory status, abundance, occurrence, seasonality, and hearing ability of the marine mammals in the action area. Lamont-Doherty's application and NSF's EA also provided distribution, life history, and population size information for marine mammals within the action area. We incorporate those descriptions by reference and briefly summarize the information in Table 6.

**Table 6** – Marine mammals most likely to be harassed incidental to Lamont-Doherty’s proposed survey during the summer (June through August) in 2015.

Species	Stock Name	Regulatory Status <sup>1, 2</sup>	Stock/Species Abundance <sup>3</sup>	Occurrence and Range	Season
<b>North Atlantic right whale</b> ( <i>Eubalaena glacialis</i> )	Western Atlantic	MMPA - D ESA – EN	456	common coastal/shelf	year-round <sup>4</sup>
<b>Humpback whale</b> ( <i>Megaptera novaeangliae</i> )	Gulf of Maine	MMPA - D ESA – EN	823	common coastal	spring - fall
Common minke whale ( <i>Balaenoptera acutorostrata</i> )	Canadian East Coast	MMPA - D ESA – NL	20,741	rare coastal/shelf	spring - summer
Sei whale ( <i>Balaenoptera borealis</i> )	Nova Scotia	MMPA - D ESA – EN	357	uncommon shelf edge	spring
<b>Fin whale</b> ( <i>Balaenoptera physalus</i> )	Western North Atlantic	MMPA - D ESA – EN	1,618	common pelagic	year-round
<b>Blue whale</b> ( <i>Balaenoptera musculus</i> )	Western North Atlantic	MMPA - D ESA – EN	440	uncommon coastal/pelagic	occasional
<b>Sperm whale</b> ( <i>Physeter macrocephalus</i> )	Nova Scotia	MMPA - D ESA – EN	2,288	common pelagic	year-round
Dwarf sperm whale ( <i>Kogia sima</i> )	Western North Atlantic	MMPA - NC ESA – NL	3,785	uncommon shelf	year-round
Pygmy sperm whale ( <i>K. breviceps</i> )	Western North Atlantic	MMPA - NC ESA – NL	3,785	uncommon shelf	year-round
Cuvier's beaked whale ( <i>Ziphius cavirostris</i> )	Western North Atlantic	MMPA - NC ESA – NL	6,532	uncommon shelf/pelagic	spring - summer
Blainville's beaked whale ( <i>Mesoplodon densirostris</i> )	Western North Atlantic	MMPA - NC ESA – NL	7,092 <sup>5</sup>	uncommon shelf/pelagic	spring - summer
Gervais' beaked whale ( <i>M. europaeus</i> )	Western North Atlantic	MMPA - NC ESA – NL	7,092 <sup>5</sup>	uncommon shelf/pelagic	spring - summer
Sowerby's beaked whale ( <i>M. bidens</i> )	Western North Atlantic	MMPA - NC ESA – NL	7,092 <sup>5</sup>	uncommon shelf/pelagic	spring - summer
True's beaked whale ( <i>M. mirus</i> )	Western North Atlantic	MMPA - NC ESA – NL	7,092 <sup>5</sup>	uncommon shelf/pelagic	spring - summer
Northern bottlenose whale ( <i>Hyperoodon ampullatus</i> )	Western North Atlantic	MMPA - NC ESA – NL	unknown	rare pelagic	unknown
Rough-toothed dolphin ( <i>Steno bredanensis</i> )	Western North Atlantic	MMPA - NC ESA – NL	271	rare pelagic	summer
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	Western North Atlantic Offshore	MMPA - NC ESA – NL	77,532	common pelagic	spring - summer
	Western North Atlantic Northern Migratory Coastal	MMPA - D ESA – NL	11,548 <sup>6</sup>	uncommon coastal within the 25-m isobath and estuaries	summer
Pantropical spotted dolphin ( <i>Stenella attenuata</i> )	Western North Atlantic	MMPA - NC ESA – NL	3,333	rare pelagic	summer - fall
Atlantic spotted dolphin ( <i>S. frontalis</i> )	Western North Atlantic	MMPA - NC ESA – NL	44,715	common coastal	summer - fall
Spinner dolphin ( <i>S. longirostris</i> )	Western North Atlantic	MMPA - NC ESA – NL	unknown	rare pelagic	unknown
Striped dolphin ( <i>S. coeruleoalba</i> )	Western North Atlantic	MMPA - NC ESA – NL	54,807	uncommon shelf	summer
Short-beaked common dolphin ( <i>Delphinus delphis</i> )	Western North Atlantic	MMPA - NC ESA – NL	173,486	common shelf/pelagic	summer - fall
White-beaked dolphin ( <i>Lagenorhynchus albirostris</i> )	Western North Atlantic	MMPA - NC ESA – NL	2,003	rare coastal/shelf	summer
Atlantic white-sided-dolphin ( <i>L. acutus</i> )	Western North Atlantic	MMPA - NC ESA – NL	48,819	uncommon shelf/slope	summer - winter
Clymene dolphin ( <i>Stenella clymene</i> )	Western North Atlantic	MMPA - NC ESA – NL	6,086 <sup>7</sup>	rare slope	summer
Fraser's dolphin ( <i>Lagenodelphis hosei</i> )	Western North Atlantic	MMPA - NC ESA – NL	726 <sup>8</sup>	Pelagic	Rare

Risso's dolphin ( <i>Grampus griseus</i> )	Western North Atlantic	MMPA - NC ESA – NL	18,250	common shelf/slope	year-round
Melon-headed whale ( <i>Peponocephala electra</i> )	Western North Atlantic	MMPA - NC ESA – NL	2,283 <sup>9</sup>	Pelagic	Rare
False killer whale ( <i>Pseudorca crassidens</i> )	western North Atlantic	MMPA - NC ESA – NL	442	rare pelagic	spring - summer
Pygmy killer whale ( <i>Feresa attenuate</i> )	Western North Atlantic	MMPA - NC ESA – NL	1,108 <sup>10</sup>	Pelagic	unknown
Killer whale ( <i>Orcinus orca</i> )	Western North Atlantic	MMPA - NC ESA – NL	28 <sup>11</sup>	Coastal	unknown
Long-finned pilot whale ( <i>Globicephala melas</i> )	Western North Atlantic	MMPA - NC ESA – NL	26,535	uncommon shelf/pelagic	summer
Short-finned pilot whale ( <i>G. macrorhynchus</i> )	Western North Atlantic	MMPA - NC ESA – NL	21,515	uncommon shelf/pelagic	summer
Harbor porpoise ( <i>Phocoena phocoena</i> )	Gulf of Maine/ Bay of Fundy	MMPA - NC ESA – NL	79,883	common coastal	year-round
Gray seal ( <i>Halichoerus grypus</i> )	Western North Atlantic	MMPA - NC ESA – NL	331,000	common coastal	fall - spring
Harbor seal ( <i>Phoca vitulina</i> )	Western North Atlantic	MMPA - NC ESA – NL	75,834	common coastal	fall - spring
Harp seal ( <i>Pagophilus groenlandicus</i> )	Western North Atlantic	MMPA - NC ESA – NL	8,600,000	rare pack ice	Jan - May

<sup>1</sup> MMPA: D = Depleted, S = Strategic, NC = Not Classified.

<sup>2</sup> ESA: EN = Endangered, T = Threatened, DL = Delisted, NL = Not listed.

<sup>3</sup> NOAA Technical Memorandum NMFS-NE-228, U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2013 (Waring *et al.*, 2014) and the Draft 2014 U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (*in review*, 2014).

<sup>4</sup> Seasonality based on Whitt *et al.*, 2013.

<sup>5</sup> Undifferentiated beaked whales abundance estimate (Waring *et al.*, 2014).

<sup>6</sup> During summer months, the primary habitat of the western north Atlantic, Northern Migratory Coastal Stock of bottlenose dolphins is primarily in waters less than 20 m deep within the 25-m isobath, including estuarine and inshore waters (Waring *et al.*, 2014; Kenney, 1990). Toth *et al.* (2012) suggested a portioning of the Northern Migratory Coastal Stock in waters off of New Jersey. They identified two clusters, one cluster inhabiting waters 0-1.9 km from the shore and a second cluster inhabiting waters 1.9 to 6 km from shore.

<sup>7</sup> There is no abundance information for this species in the Atlantic. The best available estimate of abundance was 6,086 (CV=0.93) (Mullin and Fulling, 2003).

<sup>8</sup> There is no abundance information for this species in the Atlantic. The best available estimate of abundance was 726 (CV=0.70) for the Gulf of Mexico stock (Mullin and Fulling, 2004).

<sup>9</sup> There is no abundance information for this species in the Atlantic. The best available estimate of abundance was 2,283 (CV=0.76) for the Gulf of Mexico stock (Mullin, 2007).

<sup>10</sup> There is no abundance information for this species in the Atlantic. Abundance estimate derived from the Northern Gulf of Mexico stock = 152 (Mullin, 2007) and the Hawaii stock = 956 (Barlow, 2006).

<sup>11</sup> There is no abundance information for this species in the Atlantic. Abundance estimate derived from the Northern Gulf of Mexico stock = 28 (Waring *et al.*, 2014).

**Pinnipeds:** For the proposed Authorization, we considered authorizing take for pinnipeds based upon the best available density information (Navy, 2007) and other anecdotal sources (MMSC, 2014). This section includes a brief summary on life history information for gray, harp, and harbor seals.

**Harbor Seals:** Harbor seals are part of the “true seal” family, *Phocidae*. True seals lack external ear flaps and have short forelimbs that result in limited locomotion on land. Harbor seals typically inhabit temperate coastal habitats and use rocks, reefs, beaches, and drifting glacial ice as haul outs and pupping sites (Waring, *et al.*, 2014). On the east coast, they range from the Canadian Arctic to southern New England, New York, and occasionally the Carolinas (Waring *et al.*, 2010; Waring, *et al.*, 2014). There are three well known, long-term haul out sites in New Jersey: Sandy Hook, Barnegat Inlet, and Great Bay (NJDEP, 2010).

The best estimate of abundance for harbor seals is 70,142 (CV=0.29) with a minimum population estimate of 55,409 based on corrected available counts along the Maine coast in 2012 (Waring, et al., 2014). Harbor seals eat a variety of prey consisting mainly of fish, shellfish, and crustaceans. Researchers have found that seals complete both shallow and deep dives during hunting depending on the availability of prey (Tollit et al., 1997).

**Gray Seals:** Gray seals, also from the Phocid family, inhabit coastal waters and typically haul out on rocky coasts and islands, sandbars, ice shelves, and icebergs. The best abundance estimate for the Western North Atlantic stock is 331,000 (Hammill et al., 2012, in prep.). Gray seal abundance is likely increasing in the U.S. Atlantic Exclusive Economic Zone (EEZ), but the rate of increase is unknown (Waring, et al., 2014). Gray seals are opportunistic feeders that consume between 4-6% of their body weight per day. Food sources include fish, crustaceans, squid, octopus, and even seabirds on occasion.

**Harp Seals:** The harp seal has a widespread distribution in the Arctic and in cold waters of the North Atlantic ((Jefferson et al., 2008)). It is the most abundant seal in the North Atlantic, with most seals aggregating off the east coast of Newfoundland and Labrador to pup and breed; the remainder congregates in the Gulf of St. Lawrence (Lavigne & Kovacs, 1988). These seals are highly migratory (Stenson & Sjare, 1997) and the southern limit of their habitat extends into the U.S. Atlantic Exclusive Economic Zone during winter and spring (Waring, et al., 2014). The best estimate of abundance for harp seals is 7.1 million ((Hammill et al., 2012, in prep). Jefferson *et al.* (2008) indicate that vagrant harp seals reach as far south as New York. Sightings of harp seals off the U.S. east coast, from Maine to New Jersey, are rare but have been increasing in recent years, particularly from January to May (Harris & Gupta, 2006). Harp seals are modest divers by pinniped standards. The average maximum dive is to about 1,200 feet (370 m), lasting approximately 16 minutes. They eat a variety of fish and invertebrates, but mainly focus on smaller fish such as capelin, arctic and polar cod, and invertebrates including krill.



## CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter of the EA includes a discussion of the impacts of the four alternatives on the human environment. Lamont-Doherty’s application, our notice of a proposed Authorization, and other related environmental analyses identified previously, inform our analysis of the direct, indirect, and cumulative effects of our proposed issuance of an Authorization.

Under the MMPA, we have evaluated the potential impacts of Lamont-Doherty’s seismic survey activities in order to determine whether to authorize incidental take of marine mammals. Under NEPA, we have determined that an EA is appropriate to evaluate the potential significance of environmental impacts resulting from the issuance of our Authorization.

### 4.1 EFFECTS OF ALTERNATIVE 1 – ISSUANCE OF AN AUTHORIZATION WITH MITIGATION MEASURES

Alternative 1 is the Preferred Alternative, where we would issue an Authorization to Lamont-Doherty allowing the take by Level B harassment, of marine mammals, incidental to the proposed survey from June through August, 2015, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the Authorization, if issued.

#### 4.1.1 IMPACTS TO MARINE MAMMAL HABITAT

NMFS’ proposed action would have no additive or incremental effect on the physical environment beyond those resulting from the proposed survey activities. Lamont-Doherty’s proposed seismic survey is not located within a marine sanctuary, wildlife refuge, a National Park, or other conservation area. The proposed activity— which uses one seismic source vessel—would minimally add to vessel traffic in the region and would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitats. Finally, the proposed Authorization would not impact physical habitat features, such as substrates and/or water quality.

**Prey:** The overall response of fishes and squids from the seismic survey is to exhibit responses including no reaction or habituation (Peña et al., 2013) to startle responses and/or avoidance (Fewtrell & McCauley, 2012) and vertical and horizontal movements away from the sound source. We expect that the seismic survey would have no more than a temporary and minimal adverse effect on any fish or invertebrate species. Although there is a potential for injury to fish or marine life in close proximity to the vessel, we expect that the impacts of the seismic survey on fish and other marine life specifically related to acoustic activities would be temporary in nature, negligible, and would not result in substantial impact to these species or to their role in the ecosystem.

#### 4.1.2 IMPACTS TO MARINE MAMMALS

We expect that Lamont-Doherty’s 3-D seismic survey has the potential to take marine mammals by Level B harassment, as defined by the MMPA. Acoustic stimuli generated by the airgun arrays (and to a lesser extent the multibeam echosounder, sub-bottom profiler, and acoustic Doppler current profiler) may affect marine mammals in one or more of the following ways: behavioral disturbance, tolerance, masking of natural sounds, and temporary or permanent hearing impairment, or non-auditory physical effects (Richardson et al., 1995).

Our *Federal Register* notice of proposed Authorization, Lamont-Doherty’s application (LGL, 2014), NSF’s draft amended EA (NSF, 2014a) and final EA (NSF, 2014c) provide detailed descriptions of these potential effects of seismic surveys on marine mammals. We incorporate

those discussions by reference here and summarize our consideration of additional studies submitted during the public comment period in the following sections.

The effects of noise on marine mammals are highly variable, ranging from minor and negligible to potentially significant, depending on the intensity of the source, the distances between the animal and the source, and the overlap of the source frequency with the animals' audible frequency. Nevertheless, monitoring and mitigation measures required by us for Lamont-Doherty's proposed activities will effectively reduce any significant adverse effects of these sound sources on marine mammals.

**Behavioral Disturbance:** The studies discussed in the *Federal Register* notice for the proposed Authorization note that there is variability in the behavioral responses of marine mammals to noise exposure. It is important to consider context in predicting and observing the level and type of behavioral response to anthropogenic signals (Ellison et al., 2012).

Marine mammals may 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 or 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 haul-outs or rookeries). The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Richardson, et al., 1995; Southall et al., 2007).

Studies have shown that underwater sounds from seismic activities are often readily detectable by marine mammals in the water at distances of many kilometers (Castellote et al., 2012). Many studies have also shown that marine mammals at distances more than a few kilometers away often show no apparent response when exposed to seismic activities (e.g., Akamatsu et al., 1993; Harris et al., 2001; Madsen & Møhl, 2000; Malme et al., 1983, 1984; Richardson et al., 1986; Weir, 2008). Other studies have shown that marine mammals continue important behaviors in the presence of seismic pulses (e.g., Dunn & Hernandez, 2009; Greene Jr. et al., 1999; Holst & Beland, 2010; Holst & Smultea, 2008; Holst et al., 2005; Nieukirk et al., 2004; Richardson, et al., 1986; Smultea et al., 2004).

In a passive acoustic research program that mapped the soundscape in the North Atlantic Ocean, Clark and Gagnon (2006) reported that some fin whales in the northeast Pacific Ocean stopped singing for an extended period starting soon after the onset of a seismic survey in the area. 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, of the singers remained in the area. When the survey stopped temporarily, the whales resumed singing within a few hours and the number of singers increased with time. Also, one whale continued to sing while the seismic survey was actively operating (Figure 4, Clark & Gagnon, 2006). The authors concluded 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.

It is important to note that Lamont-Doherty's study area is well away from any known breeding grounds for low frequency cetaceans thereby reducing further the likelihood of causing an effect on marine mammal mating behaviors or calving.

MacLeod et al. (2006) discussed the possible displacement of fin and sei whales related to distribution patterns of the species during a large-scale, offshore seismic survey along 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 Lamont-Doherty's 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 of marine mammals.

McDonald et al. (1995) tracked blue whales relative to a seismic survey with a 1,600 in<sup>3</sup> airgun array. One 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  $\mu$ Pa (peak-to-peak)). After that point, the ship increased its distance from the whale which continued a new call sequence after approximately one hour and 10 km (6.2 mi) from the ship. The authors reported 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. Because the whale may have approached the ship intentionally or perhaps was unaffected by the airguns, the authors concluded that there was insufficient data to infer conclusions from their study related to blue whale responses (McDonald, et al., 1995).

McCauley et al. (2000; 1998) studied the responses of migrating humpback whales off western Australia to a full-scale seismic survey with a 16-airgun array (2,678 cubic inches (in<sup>3</sup>)) and to a single, 20-in<sup>3</sup> airgun. 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  $\mu$ Pa for 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  $\mu$ Pa (McCauley, et al., 2000). The authors hypothesized that the males gravitated towards the single operating air gun possibly due to its similarity to the sound produced by humpback whales breaching. Despite the evidence that some humpback whales exhibited localized avoidance reactions at received levels below 160 dB re: 1  $\mu$ Pa, the authors found no evidence of any gross changes in migration routes, such as inshore/offshore displacement during seismic operations (McCauley, et al., 2000; McCauley, et al., 1998).

DeRuiter *et al.* (2013) recently observed that beaked whales (considered a particularly sensitive species) exposed to playbacks (*i.e.*, simulated) of U.S. Navy tactical mid-frequency active sonar from 89 to 127 dB re: 1  $\mu$ Pa 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. Navy tactical mid-frequency active sonar operated at much further distances (DeRuiter, et al., 2013). As noted earlier, one must consider the importance of context (*e.g.*, the distance of a sound source from the animal) in predicting behavioral responses.

**Tolerance:** 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<sup>3</sup>) 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 reactions at received levels less than 145 dB re: 1  $\mu$ Pa at a distance of greater than 70 km (43 miles) from the seismic source (Bain & 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  $\mu$ Pa (Bain & Williams, 2006) and Dall's porpoises occupied and tolerated areas receiving exposures of 170–180 dB re: 1  $\mu$ Pa (Bain & 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 & Williams, 2006). However, it is unclear whether their movements reflected a response to the sounds (Bain & Williams, 2006). Thus, the authors surmised that the lack of gray whale responses to higher received sound levels were ambiguous at best because one expects the species to be the most sensitive to the low-frequency sound emanating from the airguns (Bain & Williams, 2006).

Pirotta et al. (2014) observed short-term responses of harbor porpoises to a 2-D seismic survey in an enclosed bay in northeast Scotland which did not result in broad-scale displacement. The harbor porpoises that remained in the enclosed bay area reduced their buzzing activity by 15% during the seismic survey (Pirotta, et al., 2014). Thus, animals exposed to anthropogenic disturbance may make trade-offs between perceived risks and the cost of leaving disturbed areas (Pirotta, et al., 2014). However, unlike the semi-enclosed environment described in the Scottish study area, Lamont-Doherty's seismic study occurs in the open ocean. Because Lamont-Doherty would conduct the survey in an open ocean area, we do not anticipate that the seismic survey would entrap marine mammals between the sound source and the shore as marine mammals can temporarily leave the survey area during the operation of the airgun(s) to avoid acoustic harassment.

**Masking:** Studies have shown that marine mammals are able to compensate for masking by adjusting their acoustic behavior such as shifting call frequencies and increasing call volume and vocalization rates. For example, blue whales increase call rates when exposed to seismic survey noise in the St. Lawrence Estuary (Di Iorio & Clark, 2010). North Atlantic right whales exposed to high shipping noise increased call frequency (Parks et al., 2007), while some humpback whales respond to low-frequency active sonar playbacks by increasing song length (Miller et al., 2000).

Risch et al. (2012) documented reductions in humpback whale 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 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  $\mu$ Pa (Risch, et al., 2012). The authors hypothesized 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). The changes in vocal behaviors related to mating activities do not apply to the marine mammal species present in the area of Lamont-Doherty's seismic survey. Again, Lamont-Doherty's study area is well away from any known breeding grounds for low frequency cetaceans, thereby reducing further the likelihood of causing an effect on marine mammal mating behaviors.

We expect that masking effects of seismic pulses would be limited in the case of smaller odontocetes given the intermittent nature of seismic pulses (22 or 65 seconds) plus the fact that sounds important to them are predominantly at much higher frequencies than are the dominant components of airgun sounds. Pinnipeds have best hearing sensitivity and/or produce most of their sounds at frequencies higher than the dominant components of airgun sounds, but there is some overlap in the frequencies of the airgun pulses and the calls. However, the intermittent nature of airgun pulses presumably reduces the potential for masking.

**Hearing Impairment:** Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Finneran et al., 2005; Finneran & Schlundt, 2013; Finneran et al., 2000; Kastak & Schusterman, 1998; Kastak et al., 1999; Schlundt et al., 2013; Schlundt et al., 2000). However, there has been no specific documentation of temporary threshold shift (TTS) or permanent hearing damage, *i.e.*, permanent threshold shift (PTS) in free-ranging marine mammals exposed to sequences of airgun pulses during realistic field conditions (NSF, 2014b).

Lucke et al. (2009) found a threshold shift (TS) of a harbor porpoise after exposing it to airgun noise with a received sound pressure level (SPL) at 200.2 dB (peak –to-peak) re: 1  $\mu$ Pa, which corresponds to a sound exposure level of 164.5 dB re: 1  $\mu$ Pa<sup>2</sup> s after integrating exposure. NMFS currently uses the root-mean-square (rms) of received SPL at 180 dB and 190 dB re: 1  $\mu$ Pa 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 determine the equivalent of rms SPL from the reported peak-to-peak SPLs. However, applying a conservative conversion factor of 16 dB for broadband signals from seismic surveys (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  $\mu$ Pa, and the received levels associated with PTS (Level A harassment) would be higher. This is still above our current 180 dB rms re: 1  $\mu$ Pa threshold for injury. However, we recognize that TTS of harbor porpoises is lower than other cetacean species empirically tested (Finneran & Schlundt, 2010; Finneran et al., 2002; Kastelein & Jennings, 2012).

Recent studies by Kujawa and Liberman (2009) and Lin et al. (2011) 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 unknown whether smaller levels of TTS would lead to similar changes. We, however, acknowledge the complexity of noise exposure on the nervous system, and will re-examine this issue as more data become available.

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 air gun volume and operating pressure varied from 40-150 in<sup>3</sup> 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 air gun impulses compared to the high-frequency hearing ability of dolphins.

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). The avoidance behaviors observed in Thompson et al.'s (1998) study supports our expectation that individual marine mammals would avoid exposure at higher levels. Also, it is unlikely that animals would encounter repeated exposures at very close distances to the sound source because Lamont-Doherty 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. We also expect that the required vessel-based visual monitoring of the exclusion zones and implementation of mitigation measures would mitigate instances of Level A harassment.

**Strandings:** 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 (Southall, et al., 2013).

We have considered the potential for behavioral responses and injury or mortality from Lamont-Doherty's use of the multibeam echosounder. Given that Lamont-Doherty proposes to conduct the survey offshore and transit in a manner that would not entrap marine mammals in shallow water, 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 proposed 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.

NOAA has declared an Unusual Mortality Event (UME) for bottlenose dolphins along the Atlantic coast from early July 2013 through the present. Elevated strandings of bottlenose dolphins have occurred in New York, New Jersey, Delaware, Maryland, Virginia, North

Carolina, South Carolina, Georgia and Florida (through Brevard County). All age classes of bottlenose dolphins are involved and strandings range from a few live animals to mostly dead animals with many very decomposed. Many dolphins have presented with lesions on their skin, mouth, joints, or lungs (NMFS, 2014a). Based upon preliminary diagnostic testing and discussion with disease experts the tentative cause of this UME could be cetacean morbillivirus (NMFS, 2014c). However the investigation is still ongoing and additional contributory factors (e.g., other pathogens, biotoxins, range expansion) to the UME are under investigation, etc. (NMFS, 2014c).

No studies are available that would inform our analysis of whether seismic surveys have any additional impacts on marine mammal species subject to a UME. As discussed above and in the analyses in other documents incorporated by reference, we have evaluated the potential effects of seismic surveys on a number of marine mammal species, including bottlenose dolphins and beaked whales, and have concluded that Lamont-Doherty's proposed seismic survey would, at most, result in a temporary modification in behavior, temporary changes in animal distribution, and/or low-level physiological effects. We base this conclusion on the following factors: (1) the available literature supports our conclusion that the low-frequency content of air gun impulses may have fewer predicted impacts on bottlenose dolphins (Schlundt, et al., 2013); (2) the mitigation and monitoring measures are expected to limit the occurrence and intensity of any exposure; and (3) any effect on the human environment due to the project's impacts on dolphins is not expected to be significant.

In sum, we interpret these effects on all marine mammals as falling within the MMPA definition of Level B (behavioral) harassment. 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.

Under the Preferred Alternative, we would authorize incidental take, by Level B harassment only, of 32 species of marine mammals. Based on our best professional judgment and our evaluation of all of the available data, we expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment.

Lamont-Doherty proposed a number of monitoring and mitigation measures for marine mammals as part of our evaluation for the Preferred Alternative. In consideration of the potential effects of the proposed seismic survey, we determined that the mitigation and monitoring measures described in section 2.3.1 of this EA would be appropriate for the preferred alternative to meet the Purpose and Need.

**Injury:** Lamont-Doherty did not request authorization to take marine mammals by injury (Level A harassment), serious injury, or mortality. Based on the results of our analyses, Lamont-Doherty's environmental analyses, and previous monitoring reports for the same activities, we do not expect Lamont-Doherty's planned activities to result in injury, serious injury, or mortality within the action area. The required mitigation and monitoring measures would minimize any potential risk for marine mammals.

**Vessel Strikes:** The potential for striking marine mammals is a concern with vessel traffic. Studies have associated ship speed with the probability of a ship strike resulting in an injury or mortality of an animal. However, it is highly unlikely that Lamont-Doherty would strike a marine mammal given the *Langseth's* slow survey speed (8 to 12 km/hr; 4 to 6 kt). Moreover,

mitigation measures would be required of Lamont-Doherty to reduce speed or alter course if a collision with a marine mammal appears likely.

**Estimated Take of Marine Mammals by Level B Incidental Harassment:** Lamont-Doherty has requested take by Level B harassment as a result of the acoustic stimuli generated by their proposed seismic survey. We expect that the survey would cause a short-term behavioral disturbance for marine mammals in the proposed area.

As mentioned previously, we estimate that the activities could potentially affect, by Level B harassment only, 32 species of marine mammals under our jurisdiction. For each species, these estimates are small numbers relative to the population sizes. Table 7 outlines, the regional density estimates for marine mammals in the action area, the number of Level B harassment takes that we propose to authorize in this Authorization, the percentage of each population or stock proposed for take as a result of Lamont-Doherty’s activities, and the population trend for each species.

**Table 7** – Proposed Level B harassment take levels, species or stock abundance, and percentage of population proposed for take during the proposed seismic survey in the Atlantic Ocean, June through August, 2015.

Species	Density Estimate <sup>1</sup>	Modeled Number of Instances of Exposures to Sound Levels $\geq 160$ dB <sup>2</sup>	Authorized Take <sup>3</sup>	Percent of Species or Stock <sup>4</sup>	Population Trend <sup>5</sup>
Blue whale	0	0	1	0.23	Unknown
Fin whale	0.014	0.65	3	0.23	Unknown
Humpback whale	0	0	3	0.36	Increasing
Minke whale	0	0	2	0.01	Unknown
North Atlantic right whale	0	0	3 <sup>6</sup>	0.65	Increasing
Sei whale	0.74	34.48	5 <sup>7</sup>	1.40	Unknown
Sperm whale	17.07	795.26	31 <sup>7</sup>	1.35	Unknown
Dwarf sperm whale	0.004	0.19	2	0.06	Unknown
Pygmy sperm whale	0.004	0.19	2	0.06	Unknown
Cuvier's beaked whale	0.57	26.56	27	0.41	Unknown
Gervais' beaked whale	0.57	26.56	27	0.37	Unknown
Sowerby's beaked whale	0.57	26.56	27	0.37	Unknown
True's beaked whale	0.57	26.56	27	0.37	Unknown
Blainville's beaked whale	0.57	26.56	27	0.37	Unknown
Northern bottlenose whale	0	0	0	0	Unknown
Rough-toothed dolphin	0	0	0	0	Unknown
Bottlenose dolphin	269	12,532.17	12,532	16.16	Unknown
Pantropical spotted dolphin	0	0	6	0.18	Unknown
Atlantic spotted dolphin	87.3	4,067.13	4,067	18.19	Unknown
Spinner dolphin	0	0	0	0	Unknown
Striped dolphin	0	0	52	0.09	Unknown
Short-beaked common dolphin	0	0	36	0.02	Unknown
White-beaked dolphin	0	0	16	0.80	Unknown
Atlantic white-sided dolphin	0	0	53	0.11	Unknown
Risso's dolphin	32.88	1,531.81	1,532	16.79	Unknown
Fraser's dolphin	0	0	0	0	Unknown
Clymene dolphin	0	0	27	0.44	Unknown



False killer whale	0	0	7	1.58	Unknown
Pygmy killer whale	0	0	2	1.32	Unknown
Killer whale	0	0	7	1.86	Unknown
Long-finned pilot whale	0.444	20.69	21	0.16	Unknown
Short-finned pilot whale	0.444	20.69	21	0.19	Unknown
Harbor porpoise	0	0	4	0.005	Unknown
Gray seal	0	0	2	0.001	Increasing
Harbor seal	0	0	2	0.003	Unknown
Harp seal	0	0	2	0.00003	Increasing

<sup>1</sup> Except where noted, densities are the mean values for the survey area calculated from the SERDP SDSS NODES summer model expressed as number of individuals per 1,000 km<sup>2</sup> (Read *et al.*, 2009).

<sup>2</sup> The modeled number of instances of exposures to sound levels  $\geq 160$  dB re: 1  $\mu$ Pa is the product of the species density (where available), the daily ensonified area of 1,226 km<sup>2</sup>, and the number of survey days (30 plus 25 percent contingency for a total of 38 days).

<sup>3</sup> Take estimate includes adjustments for species with no density information or where the SERDP SDSS NODES summer model produced a density estimate of less than 1, NMFS increased the take estimates based on sighting information and mean group size from the Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys in 2010, 2011, and 2013.

<sup>4,5</sup> Table 2 in this notice lists the stock species abundance estimates used in calculating the percentage of species/stock. Population trend information from Waring *et al.*, 2014. Unknown = Insufficient data to determine population trend.

<sup>6</sup> For North Atlantic right whales, NMFS increased the estimated mean group size of one whale (based on CeTAP (1982) and AMAPPS (2010, 2011, and 2013) survey data) to three whales account for cow/calf pairs based on information from Whitt *et al.* (2013).

<sup>7</sup> For sei and sperm whales, the result of the total number of instances of exposures for the duration of the survey would likely overestimate the take estimates because of sei and sperm whale movement patterns and habitat preferences. NMFS adjusted the authorized incidental take based on the mean (average) number of individuals sighted during the 2010, 2011, and 2013 AMAPPS summer surveys (northern and southern legs). These surveys also included fine scale-surveys of NJ waters.

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. NMFS considered this information for the proposed authorization and concluded that it was appropriate to increase Lamont-Doherty'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.

Our *Federal Register* notice for the proposed Authorization and Lamont-Doherty's application contain complete descriptions of the take estimate calculations. We do not expect the proposed activities to impact rates of recruitment or survival for any affected species or stock. Further, the activities would not adversely affect marine mammal habitat.

Under Alternative 1, the proposed action has no unmitigable adverse impact to subsistence uses, because there are no permitted subsistence uses of marine mammals in the region.

#### 4.2 EFFECTS OF ALTERNATIVE 2– NO ACTION ALTERNATIVE

Under the No Action Alternative, NMFS would not issue an Authorization to Lamont-Doherty. As a result, Lamont-Doherty would not receive an exemption from the MMPA prohibitions against the take of marine mammals.

NSF has stated that Lamont-Doherty would not conduct the survey in the absence of an Authorization. Thus, Lamont-Doherty would not conduct the seismic survey and marine mammals present in the survey area would not be incidentally harassed. This alternative would eliminate any

potential risk to the environment from the proposed research activities. The impacts to the human environment resulting from the No Action alternative—no issuance of the proposed Authorization—would be less than less than the Preferred Alternative because the

#### **4.2.1 IMPACTS TO MARINE MAMMAL HABITAT**

Under the No Action Alternative, Lamont-Doherty would not conduct the seismic survey and marine mammal habitat would not be affected by the seismic survey. This alternative would eliminate any potential risk to the environment from the proposed research activities.

#### **4.2.2 IMPACTS TO MARINE MAMMALS**

Under this No Action Alternative, Lamont-Doherty would not conduct the seismic survey and marine mammals present in the survey area would not be incidentally harassed. This alternative would eliminate any potential risk to the environment from the proposed research activities, and the applicant would not receive an exemption from the MMPA and ESA prohibitions against take.

Under Alternative 2, the proposed action has no unmitigable adverse impact to subsistence uses, as there are no permitted subsistence uses of marine mammals in the region.

### **4.3 EFFECTS OF ALTERNATIVE 3—NO ACTION / LAMONT-DOHERTY PROCEEDS WITH SURVEY**

#### **4.3.1 IMPACTS TO MARINE MAMMAL HABITAT**

Under this No Action Alternative, Lamont-Doherty's activities would likely result in increased amounts of Level B harassment to marine mammals and possibly takes by injury (Level A harassment), serious injury, or mortality—specifically related to acoustic stimuli—due to the absence of mitigation and monitoring measures required under the proposed Authorization.

#### **4.3.2 IMPACTS TO MARINE MAMMALS**

Under this No Action Alternative, Lamont-Doherty's activities would likely result in increased amounts of Level B harassment to marine mammals and possibly takes by injury (Level A harassment), serious injury, or mortality—specifically related to acoustic stimuli—due to the absence of mitigation and monitoring measures required under the proposed Authorization.

While it is difficult to provide an exact number of takes that might occur under the No Action Alternative, we would expect the numbers to be larger than those presented in Table 7 because of the lack of restrictions imposed on Lamont-Doherty's survey operations. Lamont-Doherty could take significantly more marine mammals by harassment due to the lack of required mitigation measures including shutdowns and power downs for marine mammals.

If the activities proceeded without the protective measures and reporting requirements required by a final Authorization under the MMPA, the direct, indirect, or cumulative effects on the human or natural environment of not issuing the Authorization would include the following:

- Marine mammals within the survey area could experience injury (Level A harassment) and potentially serious injury or mortality. The lack of mitigation measures that would otherwise be required in an Authorization could lead to vessels not altering their course or speed around marine mammals, not ramping up or powering or shutting down airguns

when marine mammals are within applicable injury harassment zones; and not shutting down for North Atlantic right whales or for groups of six or more large whales;

- Increases in the number of behavioral responses and frequency of changes in animal distribution because of the lack of mitigation measures required in the proposed Authorization. Thus, the incidental take of marine mammals would likely occur at higher levels than we have already identified and evaluated in our *Federal Register* notice on the proposed Authorization; and
- We would not be able to obtain the monitoring and reporting data needed to assess the anticipated impact of the activity upon the species or stock; and increased knowledge of the species as required under the MMPA.

Under Alternative 2, the proposed action has no unmitigable adverse impact to subsistence uses, as there are no permitted subsistence uses of marine mammals in the region.

#### **4.4 EFFECTS OF ALTERNATIVE 4 – ISSUANCE OF WITH ADDITIONAL MITIGATION**

##### **4.4.1 IMPACTS TO MARINE MAMMAL HABITAT**

Effects to the physical environment would be the same under Alternative 3 as those described above for Alternative 1. We would expect no additional effects beyond those already described.

##### **4.4.2 IMPACTS TO MARINE MAMMALS**

Under this Alternative, marine mammals would still experience harassment by Lamont-Doherty’s proposed seismic survey in the Atlantic Ocean. As described in Alternative 1, anticipated impacts to marine mammals associated with Lamont-Doherty’s proposed activities primarily result from noise propagation. Potential impacts to marine mammals might include one or more of the following: tolerance, masking of important natural signals, behavioral disturbance, and temporary or permanent hearing impairment or non-auditory effects. These are the same types of reactions that we would anticipate under the Preferred Alternative (Alternative 1).

The primary difference under Alternative 3 is that we would require additional mitigation and monitoring measures for detecting marine mammals. These additional measures include requiring an alternate time for the survey; implementing operational restrictions for nighttime operations; and the use of alternate technologies to augment monitoring.

**Alternate Survey Timing:** This measure would require Lamont-Doherty to postpone their research until after the summer season to minimize interactions with recreational fisheries. NSF considered this mitigation measure in their draft amended EA (NSF, 2014a) and final EA (NSF, 2014c) and concluded that the proposed dates for the cruise (June – August) met the Purpose and Need of their action because the personnel and equipment essential to meet the overall project objectives were available. This proposed measure, however, may have the added effect of increasing the number of takes for North Atlantic right whales due to their increased presence off the 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 (June – August). In contrast, peak acoustic detections for the whales occurred in the winter (Dec 18 – Apr 9) and in the spring (Apr 10– Jun 21) for north Atlantic right whales (Whitt, et al., 2013).

**Operational Restrictions:** This measure would require Lamont-Doherty to suspend their activities in low-light/nighttime conditions and minimize the number of repeated tracklines for the survey. This measure fails to meet one of Lamont-Doherty's research requirements which is to conduct the survey in the shortest time span possible, day and night. The MMPA requires us to take into account the practicability of mitigation measures. Restricting activities to daytime operations only would unnecessarily lengthen the time to complete the survey which would not be practicable from an operational standpoint. Suspending the survey at night would inevitably increase the number of days to complete the survey and would likely result in increased amounts of Level B harassment to marine mammals over a longer duration of time. While the additional measure may provide some added protection for marine mammals present in the research area during nighttime operations, we do not expect that this measure would reduce the overall level of effects. Level B harassment of marine mammals would still occur.

**Augmented Monitoring:** This measure would require the use of alternative methods to detect marine mammals beyond the proposed visual observation and passive acoustic monitoring. NSF considered this mitigation measure in their draft amended EA (NSF, 2014a) and final EA (NSF, 2014c) and concluded that at the present time, these technologies are still not feasible, commercially viable, or appropriate to meet their Purpose and Need.

While technologies for these monitoring methods are still in development, NMFS expects the new technologies to provide additional marine mammal detection capability beyond that of the visual observations from shipboard observers. In addition, improving monitoring capabilities may allow for necessary mitigation measures (*i.e.*, power-downs and shutdowns) to be implemented more quickly and more frequently, thereby, potentially reducing further the number of marine mammal takes. However, until these technologies are developed and fully tested, we are unable to provide a reasonable estimate of this reduction in take levels.

Under Alternative 3, the proposed action has no unmitigable adverse impact to subsistence uses, as there are no permitted subsistence uses of marine mammals in the region.

#### **4.5 COMPLIANCE WITH NECESSARY LAWS – NECESSARY FEDERAL PERMITS**

NMFS determined that the issuance of an Authorization is consistent with the applicable requirements of the MMPA, ESA, MSFMCA, and CZMA, and our regulations. Please refer to section 1.4 of this EA for more information.

#### **4.6 UNAVOIDABLE ADVERSE IMPACTS**

Lamont-Doherty's application, our *Federal Register* notice of a proposed Authorization, and other environmental analyses identified previously summarize unavoidable adverse impacts to marine mammals or the populations to which they belong or on their habitats, as well as subsistence uses of marine mammals, occurring in the seismic survey area. We incorporate those documents by reference.

We acknowledge that the incidental take Authorization would potentially result in unavoidable adverse impacts. However, we do not expect Lamont-Doherty's activities to have adverse consequences on the viability of marine mammals in the Atlantic Ocean. We do not expect the marine mammal populations in that area to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving and recovering in the wild.

We expect that the numbers of individuals of all species taken by harassment would be small (relative to species or stock abundance), that the seismic survey and the take resulting from the seismic survey activities would have a negligible impact on the affected species or stocks of marine mammals, and that there would not be any relevant subsistence impacts.

#### **4.7 CUMULATIVE EFFECTS**

NEPA defines cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

The proposed seismic survey would add another, albeit temporary, activity to the marine environment in the Atlantic Ocean and the proposed survey would be limited to a relatively small area for a comparatively short period of time. NSF’s draft amended EA (NSF, 2014a) and final EA (NSF, 2014c) summarize the potential cumulative effects to marine mammals or the populations to which they belong to and their habitats within the survey area. This section incorporates the NSF’s draft amended EA (NSF, 2014a) and final EA (NSF, 2014c) by reference and provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

##### **4.7.1 PREVIOUS SEISMIC RESEARCH SURVEYS IN THE SAME AREA**

NSF’s draft amended EA (NSF, 2014a) and final EA (NSF, 2014c) acknowledges that scientists have conducted numerous 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<sup>3</sup> array in 1990; a single, 45-in<sup>3</sup> GI Gun in 1996 and 1998; and two 45-in<sup>3</sup> GI Guns in 2002).

##### **4.7.2 FUTURE SEISMIC RESEARCH IN THE ATLANTIC OCEAN**

The U.S. Geological Survey (USGS) would conduct two seismic surveys over the span of two years to support the delineation of the U.S. Extended Continental Shelf (ECS) in the Atlantic Ocean August through September, 2014, and April to August, 2015. The USGS would use the *Langseth* to conduct survey for approximately 18 to 21 days covering approximately 3,000 km of seismic tracklines that do not overlap with Lamont-Doherty’s proposed survey offshore New Jersey.

USGS’ 2015 survey is short-term in nature. As the Authorization holder, USGS would be required to use mitigation and monitoring measures to minimize impacts to marine mammals and other living marine resources in the activity area. We are unaware of any synergistic impacts to marine resources associated with reasonably foreseeable future actions that may be planned or occur within the same region of influence as the proposed survey.

##### **4.7.3 UNUSUAL MORTALITY EVENT (UME) FOR BOTTLENOSE DOLPHINS**

NOAA has declared an UME for bottlenose dolphins along the Atlantic coast from early July 2013 through the present. Elevated strandings of bottlenose dolphins have occurred in North Carolina. All age classes of bottlenose dolphins are involved and strandings range from a few live animals to mostly dead animals with many very decomposed (NMFS, 2014a). Based upon preliminary diagnostic testing and discussion with disease experts, the tentative cause of this UME could be cetacean morbillivirus (NMFS, 2014c). However the investigation is still ongoing

and additional contributory factors (pathogens, biotoxins, range expansion) to the UME are under investigation. (NMFS, 2014c).

#### **4.7.4 MILITARY ACTIVITIES**

Although the proposed survey will occur within the U.S. Navy's Atlantic City Range Complex, this range is one of several range complexes collectively referred to as the "Northeast Range Complexes". The type of activities conducted by the U.S. Navy in these range complexes includes the use of active sonars, gunnery events with both inert and explosive rounds, bombing events with both inert and explosive bombs, and other testing and training activities (NSF, 2014a). . If Lamont-Doherty's proposed activities were to occur simultaneously, the cumulative environmental effects resulting from the seismic survey would be negligible and not additive or cumulative because the proposed survey would be transitory, moving about 200 km a day. The implementation of mitigation measures and the limited spatial overlap with other activities would minimize any potential for cumulative effects.

#### **4.7.5 FUTURE OIL AND GAS EXPLORATION**

The proposed survey site is outside of the Bureau of Ocean and Energy's (BOEM) Outer Continental Shelf (OCS) Mid-Atlantic and South Atlantic Planning Areas for proposed geological and geophysical (G&G) activities (BOEM, 2014). We do not anticipate that the BOEM activities would occur simultaneously to Lamont-Doherty's proposed seismic survey and we are unaware of any synergistic impacts to marine resources associated with reasonably foreseeable future actions that may be planned or occur within the same region of influence as the proposed survey.

#### **4.7.6 CLIMATE CHANGE**

##### **4.7.6.1 INTRODUCTION**

Climate change is a global issue and greenhouse gas emissions are a concern from a cumulative perspective because individual sources of greenhouse gas emissions are not large enough to have an appreciable impact on climate change. Greenhouse gases are compounds that contribute to the greenhouse effect, a natural phenomenon in which these gases trap heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, causing heating (radiative forcing) at the surface of the earth. Scientific evidence indicates a trend of increasing global temperature over the past century due to increasing greenhouse gas emissions from human activities (Karl et al., 2009). Additionally, the Intergovernmental Panel on Climate Change reports that physical and biological systems on all continents, and in most oceans, are already being affected by climate changes and that there is strong evidence for global warming associated weather changes and that humans have "very likely" contributed to this problem through burning fossil fuels and adding other "greenhouse gases" to the atmosphere (IPCC, 2007a, 2007b). Finally, some of the major potential concerns for the marine environment as a result of global warming include sea temperature rise, melting of polar ice, rising sea levels, changes to major ocean current systems and ocean acidification.

##### **4.7.6.2 CLIMATE CHANGE AND THE NORTHEAST UNITED STATES**

Over the last several decades, the Northeast United States has experienced noticeable changes in its climate. Since 1970, the average annual temperature rose by 2°F and the average winter temperature increased by 4°F. Heavy precipitation events increased in magnitude and frequency,

and for the region as a whole, the majority of winter precipitation now falls as rain, not snow. Climate scientists project that these trends will continue and over the next several decades, temperatures in the Northeast are projected to rise an additional 2.5 to 4°F (1.4 to 2.2°C) in winter and 1.5 to 3.5°F (0.8 to 1.9°C) in summer. It is further projected that the Northeast will face continued warming and more extensive climate-related changes, some of which could dramatically alter the region's economy, landscape, character and quality of life (Karl, et al., 2009)

With the large degree of uncertainty on the impact of climate change to marine mammals in the Atlantic, we recognize that warming of this region could affect the prey base and habitat quality for marine mammals. Nonetheless, we expect that the conduct of the seismic survey and the issuance of an Authorization to Lamont-Doherty would not result in any noticeable contributions to climate change.

## **CHAPTER 5 – LIST OF PREPARERS AND AGENCIES CONSULTED**

### **Agencies Consulted:**

Marine Mammal Commission  
4340 East West Highway, Room 700  
Bethesda, Maryland 20814

NOAA – National Marine Fisheries Service  
Office of Protected Resources  
Endangered Species Act Interagency Cooperation Division  
1315 East West Highway, SSMC 3  
Silver Spring, MD 20910

National Science Foundation  
Office of General Counsel  
4201 Wilson Blvd.  
Arlington, VA 22230

### **Prepared By:**

Jeannine Cody, M.Sc.  
Fisheries Biologist  
Incidental Take Program  
Permits and Conservation Division  
Office of Protected Resources  
NOAA, National Marine Fisheries Service



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**FINDING OF NO SIGNIFICANT IMPACT  
FOR THE PROPOSED ISSUANCE OF AN INCIDENTAL HARASSMENT AUTHORIZATION  
TO LAMONT-DOHERTY EARTH OBSERVATORY TO TAKE MARINE MAMMALS INCIDENTAL  
TO CONDUCTING A MARINE GEOPHYSICAL SURVEY  
IN THE NORTHWEST ATLANTIC OCEAN, JUNE – AUGUST, 2015**

**NATIONAL MARINE FISHERIES SERVICE**

**BACKGROUND**

We (National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division) propose to issue an Incidental Harassment Authorization (Authorization) to Lamont-Doherty Earth Observatory of Columbia University (Lamont-Doherty) under the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 *et seq.*) for the incidental taking of small numbers of marine mammals, incidental to the conduct of a marine geophysical (seismic) survey in federal waters in the northwest Atlantic Ocean, June through August, 2015.

Under the MMPA, NMFS, shall grant 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 would not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The Authorization must prescribe, where applicable, the permissible methods of taking; other means of effecting the least practicable impact on the species or stock and its habitat; and requirements pertaining to the mitigation, monitoring and reporting of such taking.

Our proposed action is a direct outcome of Lamont-Doherty requesting an authorization to take marine mammals, by harassment, incidental to conducting a marine seismic survey within the Atlantic Ocean. Lamont-Doherty's seismic survey activities, which have the potential to behaviorally disturb marine mammals, warrant an incidental take authorization from us under section 101(a)(5)(D) of the MMPA.

The issuance of an Authorization to Lamont-Doherty would allow for the taking of marine mammals, consistent with provisions under MMPA, and is considered a major federal action under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*). Thus, we prepared an Environmental Assessment (EA) in accordance with NEPA, the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6 "*Environmental Review Procedures for Implementing the National Environmental Policy Act*".

The EA addresses the potential environmental impacts of the proposed action and alternatives for the issuance of an Authorization and incorporates, by reference, all relevant analyses of Lamont-Doherty's proposed action within the following documents:

- NMFS' notice of the proposed Authorization in the *Federal Register* (80 FR 13961, March 17, 2015);





- *Request for an Incidental Harassment Authorization to Allow the Incidental Take of Marine Mammals during a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer, 2015* (LGL, 2014);
- *Final Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, June–July 2014* (NSF, 2014c);
- *Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer 2015* (NSF, 2014a);
- *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* (NSF, 2011); and
- *Record of Decision for Marine Seismic Research Funded by the National Science Foundation, June, 2012* (NSF, 2012)

We considered four alternatives in the analysis and Alternative 1 is the preferred alternative. And based on our review of Lamont-Doherty’s proposed seismic survey and the measures contained within Alternative 1, we have determined that no significant direct, indirect, or cumulatively significant impacts to the human environment would occur from implementing the Preferred Alternative.

#### ANALYSIS

NAO 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the CEQ regulations at 40 CFR §1508.27 state that the significance of an action should be analyzed both in terms of “context” and “intensity.” Each criterion listed below this section is relevant to making a finding of no significant impact. We have considered each criterion individually, as well as in combination with the others. We analyzed the significance of this action based on the NAO 216-6 criteria and CEQ’s context and intensity criteria. These include:

- 1) **Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in Fishery Management Plans (FMP)?**

**Response:** Our proposed action of issuing an Authorization for the take of marine mammals incidental to the conduct of a seismic survey is not expected to cause damage to the ocean and coastal habitats and/or essential fish habitat. The mitigation and monitoring measures required by the Authorization would not affect ocean and coastal habitats or essential fish habitat.

There are marine species with EFH overlapping the proposed survey area. Effects on EFH by Lamont-Doherty’s survey and issuance of the Authorization assessed here would be temporary and minor. The main effect would be short-term disturbance that might lead to temporary and localized relocation of the EFH species or their food. The actual physical and chemical properties of the EFH would not be impacted by our proposed action. Therefore, NMFS, Office of Protected Resources, Permits and Conservation Division has determined that the issuance of an Authorization for the taking of marine mammals incidental to Lamont-Doherty’s seismic survey would not have an adverse impact on EFH, and an EFH consultation is not required.

- 2) **Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?**

*Response:* We do not expect our action to have a substantial impact on biodiversity or ecosystem function within the affected environment. Our proposed action of authorizing Level B harassment for Lamont-Doherty's seismic survey would be limited to temporary behavioral responses (such as brief masking of natural sounds) and temporary changes in animal distribution. These effects would be short-term and localized.

- 3) **Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?**

*Response:* The proposed survey activities would occur 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 and away from any populated area. We do not expect our action to have a substantial adverse impact on public health or safety as the taking, by harassment, of marine mammals would pose no risk to humans.

- 4) **Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?**

*Response:* We have determined that our issuance of an Authorization would likely result in limited adverse effects to 32 species of marine mammals. The EA evaluates the affected environment and potential effects of our proposed action, indicating that Lamont-Doherty's seismic survey has the potential to affect marine mammals in a way that requires authorization under the MMPA. The activities and required mitigation measures would not affect physical habitat features, such as substrates and water quality.

We have determined that the proposed activities may result in some Level B harassment (in the form of short-term and localized changes in behavior and displacement) of small numbers, relative to the population sizes, of 32 species of marine mammals. The impacts of the seismic survey on marine mammals relate to acoustic activities, and we expect these to be temporary in nature and not result in substantial impact to marine mammals or to their role in the ecosystem.

The seismic surveys may have the potential to adversely affect the following species listed as threatened or endangered marine mammals under the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*): blue, fin, humpback, North Atlantic right, sei, and sperm whales. A May 2015 Biological Opinion issued under the ESA concluded that Lamont-Doherty's project was not likely to jeopardize the continued existence of any listed species and would not affect critical habitat.

To reduce the potential for disturbance from the activities, Lamont-Doherty would implement several monitoring and mitigation measures for marine mammals, which are outlined in the EA. Taking these measures into consideration, we expect that the responses of marine mammals from the Preferred Alternative would be limited to temporary displacement from the area and/or short-term behavioral changes, falling within the MMPA definition of "Level B harassment." We do not anticipate that take by injury (Level A harassment), serious injury, or mortality

would occur, nor have we authorized take by injury, serious injury, or mortality. We expect that impacts would be at the lowest level practicable due to the incorporation of the proposed mitigation measures.

**5) Are significant social or economic impacts interrelated with natural or physical environmental effects?**

*Response:* We expect that the primary impacts to the natural and physical environment would be temporary in nature with no interrelated significant social or economic impacts. Issuance of an Authorization would not result in inequitable distributions of environmental burdens or access to environmental goods.

We have determined that issuance of the Authorization would not adversely affect low-income or a minority population—as our action only affects marine mammals. Further, there would be no impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses, as there are no such uses of marine mammals in the proposed action area. Therefore, we expect that no significant social or economic effects would result from our issuance of an Authorization or Lamont-Doherty’s proposed seismic survey.

**6) Are the effects on the quality of the human environment likely to be highly controversial?**

*Response:* Although there is some lack of agreement within the scientific and stakeholder communities about the potential effects of noise on marine mammals, there is not a substantial dispute about the size, nature, or effect of our proposed action. For several years, we have assessed and authorized incidental take for multiple geophysical surveys conducted within the same year and have developed relatively standard mitigation and monitoring measures, all of which have been vetted during past public comment periods. The scope of this action is no different than past geophysical surveys, is not unusually large or substantial, and would include the same or similar mitigation and monitoring measures required in past surveys. Previous projects of this type required marine mammal monitoring and monitoring reports, which have been reviewed by us to ensure that activities have a negligible impact on marine mammals.

NMFS received comments from private citizens, the state of New Jersey, 2 organizations, and the Marine Mammal Commission. Members of the public commented on their general opposition towards any type of seismic study within the Atlantic Ocean and Lamont-Doherty’s action. We fully considered all of the public comments in preparing the proposed Authorization and the EA. Although some members of the public have raised concern over the effects of the survey, we have determined, based on the best available scientific literature, the limited duration of the project, and the low-level effects to marine mammals, that our proposed Authorization would have a negligible impact on the affected species or stocks of marine mammals.

- 7) **Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?**

*Response:* The issuance of an Authorization for the take of marine mammals incidental to the conduct of a seismic survey would not impact the survey area. There are no unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas that could potentially be affected by our proposed action. The impacts to EFH and habitat from Lamont-Doherty's action would likely have minor adverse effects but would be localized and short-term in nature. (See responses to questions 1 and 2.)

- 8) **Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?**

*Response:* The potential risks associated with research seismic surveys are neither unique nor unknown nor is there significant uncertainty about impacts. We have issued Authorizations for similar activities or activities with similar types of marine mammal harassment in the Atlantic, Pacific, and Southern Oceans and conducted NEPA analysis on those projects. In no case have impacts to marine mammals from these past activities, as determined from monitoring reports, exceeded our analysis under the MMPA and NEPA. Therefore, we expect any potential effects from the issuance of our Authorization to be similar to prior activities which are not likely to be highly uncertain or involve unique or unknown risks.

- 9) **Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?**

*Response:* The EA and the documents it references analyzed the issuance of an Authorization for the take of marine mammals incidental to the conduct of a seismic survey the impacts of the seismic survey in light of other human activities within the study area. We expect the following combination to result in no more than minor and short-term impacts to marine mammals in the survey area in terms of overall disturbance effects: (a) our issuance of an Authorization with prescribed mitigation and monitoring measures for the seismic survey; (b) past, present, and reasonably foreseeable future seismic surveys in the Atlantic Ocean offshore New Jersey; (c) military activities; (d) unusual mortality event for bottlenose dolphins; (e) future oil and gas exploration; and (f) climate change.

The proposed action of Lamont-Doherty conducting the survey in the Atlantic Ocean and our proposed action of issuing an Authorization to Lamont-Doherty for the incidental take (Level B behavioral harassment) of a small number of marine mammals are interrelated. The survey conducted under the requirements of an Authorization authorizing Level B harassment of marine mammals is not expected to result in cumulatively significant impacts when considered in relation to other separate actions with individually insignificant effects.

We have issued incidental take authorizations for other research surveys that may have resulted in the harassment of marine mammals, but these research seismic surveys are dispersed both geographically (throughout the world) and temporally, are short-term in nature, and use mitigation and monitoring measures to minimize impacts to marine mammals and to minimize other potential adverse environmental impacts in the activity area.

We are aware of one other research seismic survey in the Atlantic Ocean scheduled for offshore New Jersey. On August 21, 2014, we issued an Authorization for a U.S. Geological Survey (USGS) survey for the take of marine mammals, by Level B harassment, incidental to conducting a seismic survey in the Atlantic Ocean off the eastern seaboard, August to September, 2014 and April, 2015. The USGS prepared a separate EA for their action and issued a FONSI. NMFS adopted the EA on August 21, 2014 and determined that the issuance of the Authorization was not likely to result in significant impacts on the human environment and prepared a FONSI.

Both USGS surveys are dispersed both geographically and temporally, and are short-term in nature. The Authorizations require mitigation and monitoring measures to minimize impacts to marine mammals and other living marine resources in the activity area. We are unaware of any synergistic impacts to marine resources associated with reasonably foreseeable future actions that may be planned or occur within the same region of influence.

The Cumulative Effects section of the EA and the material incorporated by reference go into more detail regarding other past, present, and reasonably foreseeable future actions, but concludes that the impacts of Lamont-Doherty's proposed survey in the Atlantic Ocean are expected to be no more than minor and short-term with no potential to contribute to cumulatively significant impacts.

**10) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?**

*Response:* We have determined that the proposed action is not an undertaking with the potential to affect historic resources. The issuance of an Authorization for the take of marine mammals incidental to the conduct of a seismic survey would affect marine mammals and would not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources.

**11) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?**

*Response:* Our proposed action does not have the potential to introduce or spread non-indigenous species because it does not encourage or require the *Langseth* to conduct long-range vessel transit that would lead to the introduction or spread of non-indigenous species. The *Langseth* complies with all international and U.S. national ballast water requirements to prevent the spread of a non-indigenous species.

**12) Is the proposed action likely to establish a precedent for future actions with significant effects or does it represent a decision in principle about a future consideration?**

*Response:* Our action of issuing an Authorization for the take of marine mammals incidental to the conduct of a seismic survey would not set a precedent for future actions with significant effects or represent a decision in principle. Each MMPA authorization applied for under section 101(a)(5) must contain information identified in our implementing regulations. We consider each activity specified in an application separately and, if we issue an Authorization, we must determine that the impacts from the specified activity would result in a negligible impact to the affected species or stocks. Our issuance of an Authorization may inform the environmental review for future projects, but would not establish a precedent or represent a decision in principle about a future consideration.

**13) Can the proposed action reasonably be expected to threaten a violation of any Federal, State, or local law or requirements imposed for the protection of the environment?**

*Response:* The issuance of an Authorization would not result in any violation of federal, state, or local laws for environmental protection. The applicant is required to obtain any additional federal, state, and local permits necessary to carry out the proposed activities.

**14) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?**

*Response:* The proposed action would not result in any significant cumulative adverse effects on target or non-target species incidentally taken by harassment due to seismic survey activities.

We have determined that marine mammals may exhibit behavioral changes such as avoidance of or changes in movement within the action area. However, we do not expect the authorized harassment to result in significant cumulative adverse effects on the affected species or stocks.

We have issued incidental take authorizations for other seismic research surveys (to Lamont-Doherty and other entities) that may have resulted in the harassment of marine mammals, but they are dispersed both geographically (throughout the world) and temporally, are short-term in nature, and all use mitigation and monitoring measures to minimize impacts to marine mammals. Because of the relatively short time that the project area would be ensonified (not more than 30 days), the action would not result in synergistic, or cumulative adverse effects that could have a substantial effect on any species.

**DETERMINATION**

In view of the information presented in this document and the analysis contained in the supporting 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, 2015*”, and documents that it references, we have determined that issuance of an Incidental Harassment Authorization to Lamont-Doherty in accordance with Alternative 1 (Preferred Alternative) would not significantly impact the quality of the human environment, as described in this FONSI and in the EA.

In addition, we have addressed all beneficial and adverse impacts of the action to reach the conclusion of no significant impacts. Accordingly, the preparation of an Environmental Impact Statement for this action is not necessary.

**MAY - 5 2015**

*Perry Cayado*

*for*

\_\_\_\_\_  
Donna S. Wieting  
Director, Office of Protected Resources,  
National Marine Fisheries Service

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Date