



To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

**TITLE:** Proposed Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey over the Mid-Atlantic Ridge in the South Atlantic Ocean, January – March, 2016.

**LOCATION:** The Mid-Atlantic Ridge in the South Atlantic Ocean

**SUMMARY:** We, the National Marine Fisheries Service, propose to issue an Incidental Harassment Authorization (Authorization) to the Lamont-Doherty Earth Observatory for the taking, by harassment, of small numbers of marine mammals, incidental to conducting a marine geophysical (seismic) survey in the South Atlantic Ocean, January – March 2016.

We prepared an Environmental Assessment (EA) titled, *Proposed Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey over the Mid-Atlantic Ridge in the South Atlantic Ocean, January – March, 2016*, and prepared an independent Finding of No Significant Impact (FONSI). NMFS determined that the impact of conducting the seismic survey may result, at worst, in a temporary modification in behavior of small numbers of several species of marine mammals. Based on its review of the record, including the EA and FONSI, NMFS determined that issuance of the Authorization will not result in any significant direct, indirect, or cumulative impact to any element of the human environment. NMFS does not anticipate that take by serious injury or mortality would occur. We have further determined that this activity will result in a negligible impact on the affected species or stocks.

**RESPONSIBLE OFFICIAL:**

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UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
PROGRAM PLANNING AND INTEGRATION  
Silver Spring, Maryland 20910

All beneficial and adverse impacts of the action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary. We enclose for your information a copy of the FONSI prepared by us and supporting documentation.

Although NOAA is not soliciting comments on this FONSI, we will consider any comments submitted that would assist us in preparing future NEPA documents.

Please submit any written comments to the responsible official named above.

Sincerely,

TRONVIG.KRISTEN.

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Kristen A. Tronvig

Acting NOAA NEPA Coordinator

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Enclosure



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## 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 over the Mid-Atlantic Ridge in the South Atlantic Ocean, January – March, 2016.

**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,  
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**LOCATION:** The Mid-Atlantic Ridge in the South Atlantic Ocean.

**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 harassment, of marine mammals, incidental to a marine geophysical survey in the South Atlantic Ocean, January to March, 2016

**DATE:** December 2015

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## LIST OF ABBREVIATIONS OR ACRONYMS

Authorization	Incidental Harassment Authorization
CFR	Code of Federal Regulations
Commission	Marine Mammal Commission
dB	decibel
EA	Environmental Assessment
EEZ	Economic Exclusion Zone
EIS	Environmental Impact Statement
E.O.	Executive Order
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
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> )
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
OBS	ocean bottom seismometer
OMB	Office of Management and Budget
Opinion	Biological Opinion

## 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 South Atlantic Ocean. 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 within international waters of the South Atlantic Ocean, January through March, 2016. 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 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 proposed 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.

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

Lamont-Doherty proposes to use the R/V *Marcus G. Langseth* (*Langseth*) to conduct the proposed survey. The purpose of the survey is to collect and analyze seismic refraction data from the Mid-Atlantic Ridge to the Rio Grande Rise in the South Atlantic Ocean. Lamont-Doherty’s application (LGL, 2015) (incorporated by reference here, see page 2) for more detailed information on the proposed research objectives.

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: Evolution of South Atlantic Ocean Crust: A Seismic Transect* ([NSF Award #1537108](#)) 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 South Atlantic Ocean, as a part of the NSF Act of 1950.

Acoustic stimuli generated by the seismic airgun array have the potential to cause 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 41 marine mammal species with confirmed or potential occurrence in the proposed action area, Tables 1(a), 1(b), and 1(c) in this section. These species would most likely be harassed incidental to Lamont-Doherty conducting the seismic survey (See Table 5, Take Estimates).

**Table 1(a).** Mysticetes that could potentially occur in the proposed activity area.

Mysticetes		
1	Antarctic minke whale	<i>Balaenoptera bonaerensis</i>
2	Blue whale	<i>Balaenoptera musculus</i>
3	Bryde's whale	<i>Balaenoptera edeni</i>
4	Common (dwarf) minke whale	<i>Balaenoptera acutorostrata</i>
5	Fin whale	<i>Balaenoptera physalus</i>
6	Humpback whale	<i>Megaptera novaeangliae</i>
7	Sei whale	<i>Balaenoptera borealis</i>
8	Southern right whale	<i>Eubalaena australis</i>

**Table 1(b).** Odontocetes that could potentially occur in the proposed activity area.

Odontocetes		
1	Andrew’s beaked whale	<i>Mesoplodon bowdoini</i>
2	Arnoux’s beaked whale	<i>Berardius arnuxii</i>
3	Atlantic spotted dolphin	<i>Stenella frontalis</i>
4	Blainville’s beaked whale	<i>Mesoplodon densirostris</i>
5	Clymene dolphin	<i>Stenella clymene</i>
6	Common bottlenose dolphin	<i>Tursiops truncatus</i>

7	Cuvier's beaked whale	<i>Ziphius cavirostris</i>
8	Dwarf sperm whale	<i>Kogia sima</i>
9	False killer whale	<i>Pseudorca crassidens</i>
10	Fraser's dolphin	<i>Lagenodelphis hosei</i>
11	Gervais' beaked whale	<i>Mesoplodon europaeus</i>
12	Gray's beaked whale	<i>Mesoplodon grayi</i>
13	Hector's beaked whale	<i>Mesoplodon hectori</i>
14	Killer whale	<i>Orcinus orca</i>
15	Long-beaked common dolphin	<i>Delphinus capensis</i>
16	Long-finned pilot whale	<i>Globicephala melas</i>
17	Melon headed whale	<i>Peponocephala electra</i>
18	Pantropical spotted dolphin	<i>Stenella attenuata</i>
19	Pygmy killer whale	<i>Feresa attenuata</i>
20	Pygmy sperm whale	<i>Kogia breviceps</i>
21	Risso's dolphin	<i>Grampus griseus</i>
22	Rough toothed dolphin	<i>Steno bredanensis</i>
23	Shepherd's beaked whale	<i>Tasmacetus shepherdi</i>
	Short-beaked common dolphin	<i>Delphinus delphis</i>
24	Short-finned pilot whale	<i>Globicephala macrorhynchus</i>
25	Southern bottlenose whale	<i>Hyperoodon planifrons</i>
26	Southern right whale dolphin	<i>Lissodelphis peronii</i>
27	Spinner dolphin	<i>Stenella longirostris</i>
28	Sperm whale	<i>Physeter macrocephalus</i>
29	Strap-toothed beaked whale	<i>Mesoplodon layardii</i>
30	Striped dolphin	<i>Stenella coeruleoalba</i>
31	True's beaked whale	<i>Mesoplodon mirus</i>

**Table 1(c).** Pinnipeds that could potentially occur in the proposed activity area.

Pinnipeds		
1	Southern elephant seal	<i>Mirounga leonina</i>
2	Subantarctic fur seal	<i>Arctocephalus tropicalis</i>

## 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 October 30, 2015, 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 harassment incidental to the activities described in Lamont-Doherty's application (LGL, 2015) and NSF's Draft Environmental Analysis titled, *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the South Atlantic Ocean, Austral Summer 2016* (NSF, 2015). 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 75355, December 1, 2015](#));
- [Request by Lamont-Doherty Earth Observatory 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 South Atlantic Ocean, Austral Summer 2016](#) (LGL, 2015).
- [Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the South Atlantic Ocean, January – March, 2016](#) (NSF, 2015).
- [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/USGS, 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 December 1, 2015, NMFS published a notice of a proposed Authorization in the *Federal Register* ([80 FR 75355, December 1, 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 section 101(a)(5)(D) of the MMPA.

NMFS considered Lamont-Doherty’s proposed seismic survey and associated mitigation and monitoring measures and preliminarily determined that the proposed seismic survey in the South Atlantic Ocean 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 A and 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 2 because previous environmental reviews for Lamont-Doherty’s seismic survey, incorporated by reference (NSF, 2015; NSF/USGS, 2011), have evaluated the effects of these activities on other elements of the human environment.

NSF’s draft environmental analysis (NSF, 2015) which tiers from 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/USGS, 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 2** – 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, 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);
- *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, 2014); and
- *Environmental Assessment on the 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*(NMFS, 2015b).
- *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 Eastern Mediterranean Sea, Mid-November – December 2015* (NMFS, 2015a).

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 75355, December 1, 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.

### 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 3** – U.S. Federal agencies who submitted comments on our proposed action.

U.S. Federal Agencies
U.S. Marine Mammal Commission

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;
- 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.

### 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, sei, sperm, and southern right 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 six species of marine mammals listed as endangered under the ESA under NMFS’ jurisdiction: blue, fin, humpback, sei, sperm, and southern right whales.

NMFS’ proposed issuance of an Authorization is also a federal action subject to the section 7 ESA consultation requirements. For the proposed survey, NMFS requested authorization for same species of marine mammals listed as endangered under the ESA under NMFS’ jurisdiction.

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.

A January 2016 Biological Opinion issued under the ESA concluded that Lamont-Doherty's proposed action was not likely to jeopardize the continued existence of any threatened or endangered species and would not adversely modify or destroy any critical habitat.

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

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

#### **1.4.3 E.O. 12114: ENVIRONMENTAL EFFECTS ABROAD OF MAJOR FEDERAL ACTIONS.**

The requirements for Executive Order (E.O.) 12114 are discussed in Lamont-Doherty's application (LGL, 2015) and NSF's draft environmental analysis (NSF, 2015). We have incorporated both documents by reference in this EA.

Briefly, the provisions of E.O. 12114 apply to major federal actions that occur or have effects outside of U.S. territories (the United States, its territories, and possessions). Accordingly, NSF prepares environmental analyses for major federal actions which could have environmental impacts anywhere beyond the territorial jurisdiction of the United States. NOAA, as a matter of policy, prepares NEPA analyses for proposed major federal actions occurring within its territorial waters, the U.S. EEZ, the high seas, and the EEZs of foreign nations.

## 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 preferred action. It must also consider the no action alternative, even if it does not meet the stated purpose and need, so as to provide a baseline analysis against which we can compare the action alternative.

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 (see Chapter 1), which serves as the alternative's only screening criterion. We evaluated each potential alternative against this criterion. Based on this evaluation, we have identified one action alternative as reasonable and, along with the No Action Alternative; have carried two alternatives forward for evaluation in this EA.<sup>3</sup>

The Preferred Alternative includes a suite of mitigation measures intended to minimize any potential adverse effects to marine mammals. This chapter describes the alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

We did not carry forward alternatives that we considered not reasonable for detailed evaluation in this EA. Section 2.4 presents alternatives considered but eliminated from further review. The action alternative includes a suite of mitigation measures intended to minimize potentially adverse interactions with 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 LAMONT-DOHERTY'S PROPOSED ACTIVITIES

We presented a general overview of Lamont-Doherty's proposed seismic survey operations in our *Federal Register* notice of the proposed Authorization ([80 FR 75355, December 1, 2015](#)). Also, Lamont-Doherty's application (LGL, 2015) and NSF's draft environmental analysis (NSF, 2015), 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 for approximately 42 days which includes approximately 22 days of seismic surveying, and 10 days for OBS deployment/retrieval. The proposed study (*e.g.*, equipment testing, startup, line changes, repeat coverage of any areas, and equipment recovery) would include approximately 528 hours of airgun operations (*i.e.*, 22 days over 24 hours). Some minor deviation from Lamont-Doherty's requested dates of January 1 – March 31, 2016 is possible, depending on logistics, weather conditions, and the need to repeat

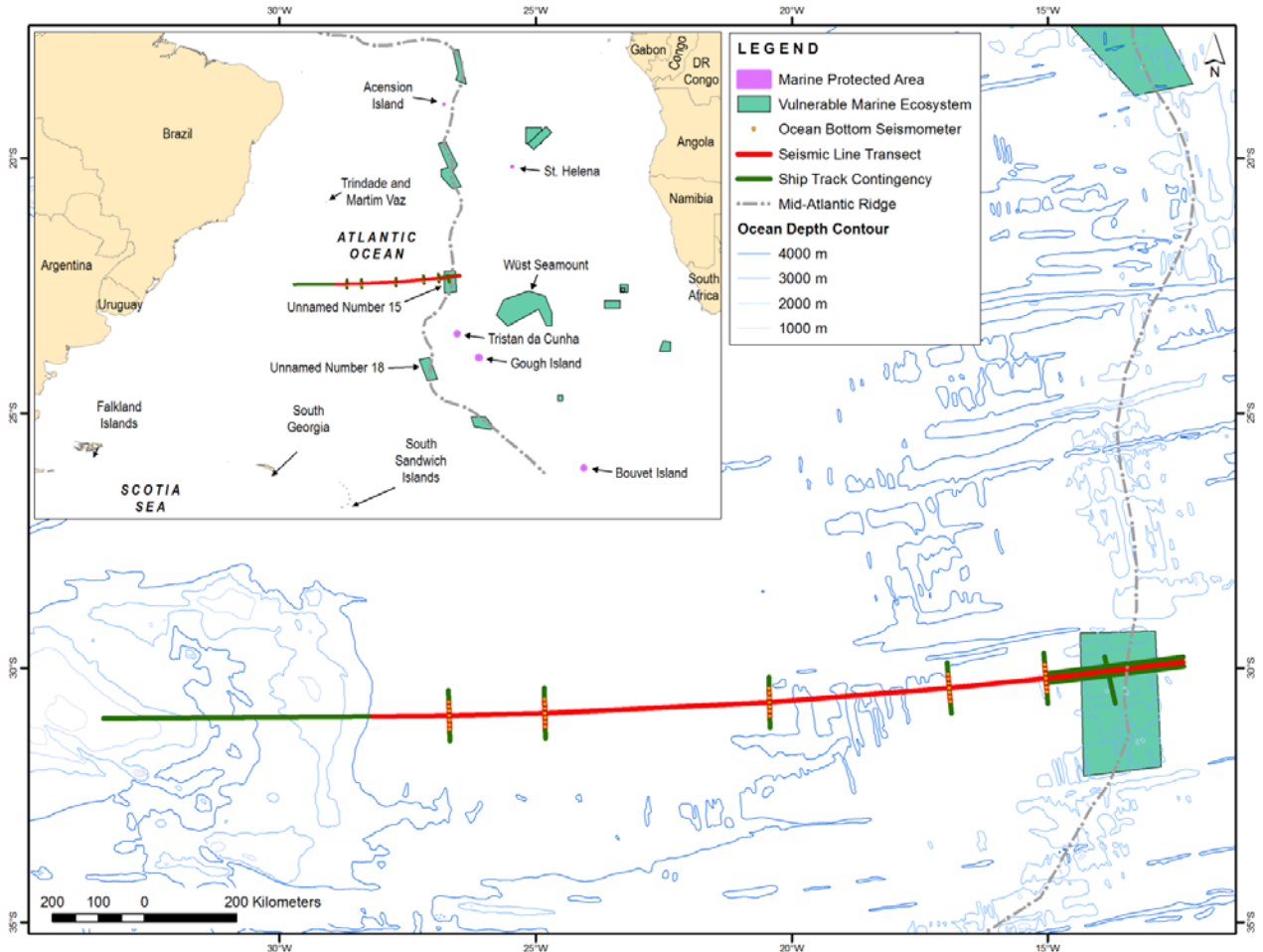
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<sup>3</sup> For instances involving federal decisions on proposals for projects, the single action alternative would consider the effects of permitting the proposed activity which would be compared to the "No action" alternative. In this case, under the No Action Alternative, the proposed activity (*i.e.*, issuing the IHA with mitigation, monitoring, and reporting requirements) would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity (NEPA; Section 1502.14(d)). 40 CFR Sec. 1508.23 states that if an agency subject to NEPA has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal, the effects can be meaningfully evaluated.

some lines if data quality is substandard. Thus, the proposed Authorization, if issued, would be effective from January 1 – March 31, 2016.

Lamont-Doherty proposes to conduct the proposed seismic survey in the South Atlantic Ocean, located approximately between 27-33°S and 10-35°W (Figure 1). Water depths in the South Atlantic survey area are approximately 1150 to 4800 meters (m) (3772 to 15,748 feet (ft)). Lamont-Doherty would conduct the proposed seismic survey entirely within international waters.

**Figure 1** – Proposed location of the seismic survey in the South Atlantic Ocean



## 2.2.2 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 depart from the Cape Verde Islands, with a round trip transit time of approximately 10 days. Some minor deviation from these dates is possible, depending on logistics and weather.

**Transects:** The proposed survey would cover a total of approximately 3,263 km (1,330 mi) of transect lines (2,127 km of primary transect line and 1,136 km of contingency transect lines with



time permitting). The proposed survey is one continuous survey line (primary) with 6 potential contingency transect lines centered on and perpendicular to the primary transect.

**Seismic Airguns:** During the survey, the *Langseth* would deploy 36 airguns as an energy source with a total volume of 6,600 cubic inches (in<sup>3</sup>). The airguns are a mixture of Bolt 1500LL and Bolt 1900LLX airguns ranging in size from 40 to 220 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). During the survey, Lamont-Doherty would plan to use the full array. The *Langseth* would tow the array at a depth of 9 m (29.5 ft) with a shot interval range of approximately 22 to 65 seconds (s) (approximately 50 to 150 m; 262 to 492 ft). During acquisition the airguns will emit a brief (approximately 0.1 s) pulse of sound. During the intervening periods of operations, the airguns are silent.

**Receiving System:** The receiving system would consist of 7 ocean bottom seismometers (OBS) for each leg of the proposed survey and a single 8-km (5-mi) hydrophone streamer. As the *Langseth* tows the airgun array along the survey lines, the OBSs and hydrophone streamer would receive the returning acoustic signals and transfer the data to the on-board processing system.

The *Langseth* would deploy seven OBSs on the sea floor at the beginning of each of five survey sections, then recover the instruments and redeploy them at the next survey section. Each seismometer is approximately 0.9 m (2.9 ft) high with a maximum diameter of 97 centimeters (cm) (3.1 ft). An anchor, made of a rolled steel bar grate which measures approximately 7 by 91 by 91.5 cm (3 by 36 by 36 inches) and weighs 45 kilograms (99 pounds) would anchor the seismometer to the seafloor.

**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 μPa.

**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 μPa.

**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/USGS, 2011).

## 2.3 DESCRIPTION OF ALTERNATIVES

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

The Proposed Action constitutes the Preferred Alternative. Under this alternative, we would issue an Authorization (valid from January 1 – March 31, 2016) to Lamont-Doherty allowing the incidental take, by 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 affecting 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 (Dunn & Hernandez) for marine mammals before the full array (*i.e.*, 6,660 in<sup>3</sup>) or a single airgun (*i.e.*, 40 in<sup>3</sup>) is in operation (Table 4).
- 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) Following a shutdown for more than 8 min and subsequent animal departure, survey operations may resume following ramp-up procedures described in Measure 4.
- 10) 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).
- 11) 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.
- 12) 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.

- 13) 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
- 14) Restrict the operation of the multi-beam echosounder, sub-bottom profiler, and acoustic Doppler current profiler during transit.

**EXCLUSION ZONES**

**Table 4** – Predicted distances to which sound levels greater than or equal to 160 re: 1  $\mu$ Pa could be received during the proposed survey areas within the South Atlantic Ocean (January – March 2016).

Source and Volume (in <sup>3</sup> )	Tow Depth (m)	Water Depth (m)	Predicted RMS Distances <sup>1</sup> (m)		
			190 dB	180 dB	160 dB
Single Bolt airgun (40 in <sup>3</sup> )	9	> 1,000	100	100	388
36-Airgun Array (6,600 in <sup>3</sup> )	9	> 1,000	286	927	5,780

<sup>1</sup>Predicted distances based on information presented in Lamont-Doherty’s application.

**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 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. 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. 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 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

For this proposed action, NMFS re-evaluated and revised the take estimates presented in Lamont-Doherty’s application (LGL, 2015) and in NSF’s draft environmental analysis (NSF, 2015). NMFS presented this re-evaluation in our *Federal Register* notice of the proposed Authorization ([80 FR 75355, December 1, 2015](#)). 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.

**Table 5** - Densities and/or mean group size, and estimates of the possible numbers of marine mammals and population percentages exposed to sound levels greater than or equal to 160 dB re: 1  $\mu$ Pa over 28 days during the proposed seismic survey in the South Atlantic Ocean (January through March, 2016).

Species	Density Estimate <sup>1</sup>	Modeled Number of Instances of Exposures to Sound Levels $\geq$ 160, 180, and 190 dB <sup>2</sup>	Proposed Level A Take <sup>3</sup>	Proposed Level B Take <sup>3</sup>	Percent of Population <sup>4</sup>
Antarctic minke whale	0.054983	2,276, 396, -	396	2,276	0.519
Blue whale	0.000032	2, 0, -	0	2	0.074
Bryde’s whale	0.000262	2, 0, -	0	2	0.005
Common minke whale	0.054983	2,276, 396, -	396	2,276	0.519
Fin whale	0.002888	106, 28, -	28	106	0.609
Humpback whale	0.000078	3, 0, -	0	3	0.200
Sei whale	0.002688	106, 28, -	28	106	1.340
Southern right whale	NA	18, 0, -	0	18	0.150
Sperm whale	0.001214	50, 0, -	0	50	0.014
Dwarf sperm whale	0.000041	2, 0, -	0	2	0.053
Pygmy sperm whale	0.000021	2, 0, -	0	2	0.053
Cuvier’s beaked whale	0.003831	156, 28, -	28	156	0.031
Andrew’s beaked whale	0.000511	28, 0, -	0	28	0.005
Arnoux’s beaked whale	0.000956	28, 0, -	0	28	0.005
Blainville’s beaked whale	0.000663	28, 0, -	0	28	0.005
Gervais’ beaked whale	0.001334	56, 0, -	0	56	0.009
Gray’s beaked whale	0.000944	28, 0, -	0	28	0.005
Hector’s beaked whale	0.000246	0, 0, -	0	0	0.000
Shepherd’s beaked whale	0.000816	28, 0, -	0	28	0.005
Strap-toothed beaked whale	0.000638	28, 0, -	0	28	0.005
True’s beaked whale	0.000876	28, 0, -	0	28	0.005
Southern bottlenose whale	0.000917	28, 0, -	0	28	0.005
Bottlenose dolphin	0.020744	848, 156, -	156	848	0.167
Rough-toothed dolphin	0.000418	22, 0, -	0	22	8.118
Pantropical spotted dolphin	0.003674	156, 28, -	28	156	5.521
Striped dolphin	0.174771	7,208, 1,294, -	1,294	7,208	15.513
Fraser’s dolphin	0.001568	56, 0, -	0	56	0.019
Spinner dolphin	0.006255	262, 50, -	50	262	0.026
Atlantic spotted dolphin	0.077173	3,180, 580, -	580	3,180	8.409
Clymene dolphin	0.000258	0, 0, -	0	0	0.000

Risso's dolphin	0.037399	1,540, 290, -	290	1,540	8.844
Long-beaked common dolphin	0.000105	0, 0, -	0	0	0.000
Short-beaked common dolphin	0.129873	5,356, 954, -	954	5,356	3.637
Southern right whale dolphin	NA	1,624, 0, -	0	1,624	Unknown
Melon-headed whale	0.006285	262, 50, -	50	262	0.624
Pygmy killer whale	0.001039	50, 0, -	0	50	1.395
False killer whale	0.000158	0, 0, -	0	0	0.000
Killer whale	0.003312	134, 28, -	28	134	0.324
Long-finned pilot whale	0.007614	318, 56, -	56	318	0.187
Short-finned pilot whale	0.015616	636, 106, -	106	636	0.371
Southern Elephant Seal	NA	56, 0, 0	0	56	0.009
Subantarctic fur seal	NA	56, 0, 0	0	56	0.018

<sup>1</sup> Densities (where available) are expressed as number of individuals per km<sup>2</sup>. Densities estimated from the Navy's Atlantic Fleet Training and Testing Navy Marine Species Density Database maps for the survey area in the Southern Atlantic Ocean. NA = Not available.

<sup>2</sup> See preceding text for information on NMFS' take estimate calculations. NA = Not applicable.

<sup>3</sup> Modeled instances of exposures include adjustments for species with no density information. The Level A estimates are overestimates of predicted impacts to marine mammals as the estimates do not take into consideration the required mitigation measures for shutdowns or power downs if a marine mammal is likely to enter the 180 dB exclusion zone while the airguns are active.

<sup>4</sup> Table 2 in this notice lists the stock species abundance estimates used in calculating the percentage of the population.

<sup>5</sup> Population trend information from Waring *et al.*, 2015. ↑ = Increasing, ↓ = Decreasing, Unknown = Insufficient data.

### 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.

### 2.4 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 describe these Alternatives here and have eliminated them from further consideration and analysis because they do not meet the purpose and need for the proposed action.

- 1) **Issuance of an Authorization with No Mitigation and Monitoring:** We considered an alternative that would allow for the issuance of an Authorization with no required mitigation or monitoring but eliminated this Alternative from consideration, as it would not be in compliance with the MMPA. For that reason, we do not analyze this alternative further in this document.
- 2) **Alternate Survey Timing:** This measure would require Lamont-Doherty to conduct research after the winter season. However, this alternative failed to meet the statutory and regulatory requirements of the MMPA for an Authorization, as Lamont-Doherty did not request nor submit an application (*i.e.*, under the MMPA the Secretary shall issue an Authorization upon request) to conduct the seismic survey at an alternate time. For this 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 Atlantic Ocean covers approximately 106 million km<sup>2</sup>, and from Iceland in the north, south to the 60°S parallel. It is composed of two similar-size basins, the North Atlantic and the South Atlantic (where the project will be located). The study area will cover 10°-35°W, 27°-33°S, from the Mid-Atlantic Ridge to the Rio Grande Rise in the South Atlantic Ocean (NSF, 2015).

#### 3.1.1 MARINE MAMMAL HABITAT

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in our *Federal Register* notice of the proposed Authorization ([80 FR 75355, December 1, 2015](#)). Also, NSF presented more detailed information on the physical and oceanographic aspects of the South Atlantic Ocean environment in the draft environmental analysis (NSF, 2015). In summary, the marine mammals in the survey area use the pelagic, open ocean waters, but may have differing habitat preferences based on their life history functions (NSF, 2015).

### 3.2 BIOLOGICAL ENVIRONMENT

#### 3.2.1 MARINE MAMMALS

We provide information on the possible or confirmed occurrence in the survey area in section 1.1.2 of this EA (Tables 1a, 1b, and 1c). 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 75355, December 1, 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** - General information on marine mammals that could potentially occur in the proposed survey areas within the South Atlantic Ocean (January through March 2016).

Species	Regulatory Status <sup>1,2</sup>	Species Abundance <sup>3</sup>	Local Occurrence and Range <sup>4</sup>	Season <sup>5</sup>
Antarctic minke whale ( <i>Balaenoptera bonaerensis</i> )	MMPA - NC ESA - NL	515,000 <sup>6</sup>	Uncommon shelf, pelagic	Winter
Blue whale ( <i>B. musculus</i> )	MMPA - D ESA - EN	2,300 <sup>7</sup>	Rare coastal, slope, pelagic	Winter
Bryde's whale ( <i>B. edeni</i> )	MMPA - NC ESA - NL	43,633 <sup>8</sup>	Rare coastal, pelagic	Winter
Common (dwarf) minke whale	MMPA -NC	515,000 <sup>6</sup>	Uncommon	Winter



<i>(B. acutorostrata)</i>	ESA – NL		shelf, pelagic	
Fin whale <i>(B. physalus)</i>	MMPA - D ESA – EN	22,000 <sup>9</sup>	Uncommon Coastal, pelagic	Fall
Humpback whale <i>(Megaptera novaeangliae)</i>	MMPA - D ESA – EN	42,000 <sup>10</sup>	Uncommon Coastal, shelf, pelagic	Winter
Sei whale <i>(B. borealis)</i>	MMPA - D ESA – EN	10,000 <sup>11</sup>	Uncommon Shelf edges, pelagic	Winter
Southern right whale <i>(Eubalaena australis)</i>	MMPA - D ESA – EN	12,000 <sup>12</sup>	Uncommon Coastal, shelf	Winter
Sperm whale <i>(Physeter macrocephalus)</i>	MMPA - D ESA – EN	355,000 <sup>13</sup>	Uncommon Slope, pelagic	Winter
Dwarf sperm whale <i>(Kogia sima)</i>	MMPA - NC ESA – NL	3,785	Rare Shelf, slope, pelagic	Winter
Pygmy sperm whale <i>(K. breviceps)</i>	MMPA - NC ESA – NL	3,785	Rare Shelf, slope, pelagic	Winter
Cuvier's beaked whale <i>(Ziphius cavirostris)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Uncommon Slope	Winter
Andrew's beaked whale <i>(Mesoplodon bowdoini)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare Pelagic	Winter
Arnoux's beaked whale <i>(Berardius arnuxii)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare Pelagic	Winter
Blainville's beaked whale <i>(M. densirostris)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare Slope, pelagic	Winter
Gervais' beaked whale <i>(M. europaeus)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare pelagic	Winter
Gray's beaked whale <i>(M. grayi)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare Pelagic	Winter
Hector's beaked whale <i>(M. hectori)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare pelagic	Winter
Shepherd's beaked whale <i>(Tasmacetus shepherdi)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare pelagic	Winter
Strap-toothed beaked whale <i>(M. layardii)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare pelagic	Winter
True's beaked whale <i>(M. mirus)</i>	MMPA - NC ESA – NL	7,092	Rare pelagic	Winter
Southern bottlenose whale <i>(Hyperoodon planifrons)</i>	MMPA - NC ESA – NL	599,300 <sup>14</sup>	Rare Coastal, shelf, pelagic	Winter
Bottlenose dolphin <i>(Tursiops truncatus)</i>	MMPA - NC ESA – NL	600,000 <sup>15</sup>	Uncommon Coastal, pelagic	Winter
Rough-toothed dolphin <i>(Steno bredanensis)</i>	MMPA - NC ESA – NL	271	Uncommon shelf, pelagic	Winter
Pantropical spotted dolphin <i>(Stenella attenuata)</i>	MMPA - NC ESA – NL	3,333	Uncommon Coastal, slope, pelagic	Winter
Striped dolphin <i>(S. coeruleoalba)</i>	MMPA - NC ESA – NL	54,807	Rare Pelagic	Winter
Fraser's dolphin <i>(Lagenodelphis hosei)</i>	MMPA - NC ESA – NL	289,000 <sup>16</sup>	Uncommon Pelagic	Winter
Spinner dolphin <i>(Stenella longirostris)</i>	MMPA - NC ESA – NL	1,200,000 <sup>16</sup>	Rare Pelagic	Winter
Atlantic spotted dolphin <i>(S. frontalis)</i>	MMPA - NC ESA – NL	44,715	Uncommon Pelagic	Winter
Clymene dolphin <i>(S. clymene)</i>	MMPA - NC ESA – NL	6,215	Rare Pelagic	Winter
Risso's dolphin <i>(Grampus griseus)</i>	MMPA - NC ESA – NL	20,692	Uncommon Pelagic	Winter
Long-beaked common dolphin <i>(Delphinus capensis)</i>	MMPA - NC ESA – NL	20,000 <sup>17</sup>	Rare Coastal	Winter
Short-beaked common dolphin <i>(Delphinus delphis)</i>	MMPA - NC ESA – NL	173,486	Uncommon Coastal, shelf	Winter
Southern right whale dolphin <i>(Lissodelphis peronii)</i>	MMPA - NC ESA – NL	Unknown	Uncommon Coastal, shelf	Winter
Melon-headed whale <i>(Peponocephala electra)</i>	MMPA - NC ESA – NL	50,000 <sup>18</sup>	Uncommon Coastal, shelf, pelagic	Winter

Pygmy killer whale ( <i>Feresa attenuate</i> )	MMPA - NC ESA – NL	3,585	Uncommon Coastal, shelf, pelagic	Winter
False killer whale ( <i>Pseudorca crassidens</i> )	MMPA - NC ESA – NL	442	Rare Pelagic	Winter
Killer whale ( <i>Orcinus orca</i> )	MMPA - NC ESA – NL	50,000 <sup>19</sup>	Uncommon Coastal, pelagic	Winter
Long-finned pilot whale ( <i>Globicephala melas</i> )	MMPA - NC ESA – NL	200,000 <sup>14</sup>	Uncommon Pelagic	Winter
Short-finned pilot whale ( <i>Globicephala macrorhynchus</i> )	MMPA - NC ESA – NL	200,000 <sup>14</sup>	Uncommon Pelagic	Winter
Southern Elephant Seal ( <i>Mirounga leonina</i> )	MMPA - NC ESA – NL	650,000 <sup>20</sup>	Rare Coastal	Winter
Subantarctic fur seal ( <i>Arctocephalus tropicalis</i> )	MMPA - NC ESA – NL	310,000 <sup>21</sup>	Uncommon Pelagic	Winter

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

<sup>3</sup> Except where noted abundance information obtained from NOAA Technical Memorandum NMFS-NE-231, U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2014 (Waring *et al.*, 2015) and the Draft 2015 U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (*in review*, 2015). NA = Not available.

<sup>4</sup> Occurrence and range information available from the International Union for the Conservation of Nature (IUCN).

<sup>5</sup> NA= Not available due to limited information on that species' seasonal occurrence in the proposed area.

<sup>6</sup> Best estimate from the International Whaling Commission's (IWC) estimate for the minke whale population (Southern Hemisphere, 2004).

<sup>7</sup> Best estimate from the IWC's estimate for the blue whale population (Southern Hemisphere, 1998).

## CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter of the EA includes a discussion of the impacts of the two alternatives on the human environment. Lamont-Doherty’s application, our *Federal Register* notice of a proposed Authorization ([80 FR 75355, December 1, 2015](#)), 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 harassment, of marine mammals, incidental to the proposed survey from January through March, 2016, 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, Handegard, & Ona, 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 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, Greene, Malme, & Thomson, 1995).

Our *Federal Register* notice of proposed Authorization ([80 FR 75355, December 1, 2015](#)), Lamont-Doherty’s application (LGL, 2015) and in NSF’s draft environmental analysis (NSF,

2015) 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 would 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, Southall, Clark, & Frankel, 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; changing 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, Clark, & Lammers, 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, Hatakeyama, & Takatsu, 1993; Harris, Miller, & Richardson, 2001; Madsen & Møhl, 2000; Malme, Miles, Clark, Tyack, & Bird, 1983, 1984; Richardson, Würsig, & Greene Jr., 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., Altman, & Richardson, 1999; Holst & Beland, 2010; Holst & Smultea, 2008; Holst, Smultea, Koski, & Haley, 2005; Nieu Kirk, Stafford, Mellinger, Dziak, & Fox, 2004; Richardson et al., 1986; Smultea, Holst, Koski, & Stoltz, 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.

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 (D. R. Thompson, Sjoberg, Bryant, Lovell, & Bjorge, 1998; P. M. 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 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, Clark, & Tyack, 2007), while some humpback whales respond to low-frequency active sonar playbacks by increasing song length (Miller, Biassoni, Samuels, & Tyack, 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 (Akamatsu et al.), which is the loss of hearing sensitivity at certain frequency ranges (Finneran, Carder, Schlundt, & Ridgway, 2005; Finneran & Schlundt, 2013; Finneran et al., 2000; Kastak & Schusterman, 1998; Kastak, Schusterman, Southall, & Reichmuth, 1999; C. E. Schlundt, J. J. Finneran, B. K. Branstetter, J. S. Trickey, & Jenkins, 2013; C. R. Schlundt, Finneran, Carder, & Ridgway, 2000).

Lucke et al. (2009) found a threshold shift (Akamatsu et al.) 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, Schlundt, Carder, & Ridgway, 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 (C. E. 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 (C. E. 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, Rowles, Gulland, Baird, & Jepson, 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 Grecian 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.

In sum, we interpret these effects on all marine mammals as falling within the MMPA definition of Level A and B harassment. We expect these impacts to be minor because we do not anticipate measurable changes to the population or measurable impacts to rookeries, mating grounds, and other areas of similar significance.

Under the Preferred Alternative, we would authorize incidental take, by harassment only, of 38 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.

**Serious Injury or Mortality:** Lamont-Doherty did not request authorization to take marine mammals by 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 serious injury or mortality within the action area. The required mitigation and monitoring measures would minimize any potential risk for marine mammals. Although considered unlikely, any Level A harassment potentially incurred would be expected to be in the form of some smaller degree of permanent hearing loss due in part to the required monitoring measures for detecting marine mammals and required mitigation measures for power downs or shut downs of the airgun array if any animal is likely to enter the Level A exclusion zone. Neither mortality nor complete deafness of marine mammals is expected to result from this survey.

**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:** 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 harassment only, 38 species of marine mammals under our jurisdiction. For each species, these estimates are small numbers relative to the population sizes.

Table 7 outlines the density estimates or estimated group size for marine mammals in the action area, the number of 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.

#### **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.

#### **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 this No Action Alternative, 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, E.O. 12114, 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 South 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 South Atlantic Ocean for a comparatively short period of time. Lamont-Doherty's application (LGL, 2015) and NSF's draft environmental analysis (NSF, 2015) 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 Lamont-Doherty's application (LGL, 2015) and in NSF's draft environmental analysis (NSF, 2015) 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**

In 1979, the University of Texas conducted a marine seismic reflection survey near the Rio Grande Rise in the South Atlantic Ocean using a 3-airgun array totaling 4500 in<sup>3</sup>. Several research surveys have also been conducted on the Walvis Ridge. During June–July 1980, The Glomar Challenger collected cores from five drill sites (~28–30°S, ~1°–30°E) as a component of the DSDP. In winter 2000, the Meteor (Cruise M49/1) completed a seismic survey of the southeastern Walvis Ridge, with related drilling for the Ocean Drilling Program Leg 208 that was conducted on the Walvis Ridge during 6 March–6 May 2003. In addition, seamount fisheries surveys and benthic studies have been completed on Walvis Ridge seamounts, an area managed by SEAFO during 2009 along the southern MAR (~0–20°S) and the Walvis Ridge (20–33°S, 5°W–10°E).

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

In the late 1960s, analog single-channel seismic data were acquired for the Deep Sea Drilling Project Expedition 3 near the proposed survey area. Two sites were drilled there during the expedition, along with numerous other sites throughout the South Atlantic Ocean. Results from that geophysical program were used as a site survey for the International Ocean Discovery Program (IODP) 853 pre-proposal, A Multidisciplinary IODP Investigation along a Crustal Flow-line Across the Western Flank of the Southern Mid-Atlantic Ridge: The South Atlantic Transect. The proposed seismic survey would provide essential site survey information for the IODP expedition, which could occur in 2016 when the IODP vessel arrives in the South Atlantic. The IODP expedition would investigate five sites using drilling and coring along ~30°S and would address hydrothermal contributions to global geochemical cycles and the response of ocean circulation to changing climate. Drilling and coring generally result in low sound energy increases in the water column (below the harassment threshold for marine mammals), especially as compared to seismic airgun surveys. The effects of the IODP expedition are not expected to result in the harassment or take of any marine mammals, and therefore are very unlikely to contribute to cumulative impacts on marine mammals.

There are no other seismic surveys with an Authorization from NMFS scheduled to occur in international waters off the South Atlantic Ocean, January through March 2016. Therefore, 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 impacts of conducting the seismic survey on marine mammals are specifically related to acoustic activities, and these are expected to be temporary in nature, negligible, and would not result in substantial impacts to marine mammals or to their role in the ecosystem. We do not expect that the issuance of an Authorization would have a significant cumulative effect on the human environment, due to the required mitigation and monitoring measures described in Section 2.3.1

NMFS does not expect that Lamont-Doherty's 28-days of proposed seismic surveys would have effects that could cause significant or long-term consequences for individual marine mammals or their populations alone or in combination with past or present activities discussed above.

### **4.7.3 CLIMATE CHANGE**

#### **4.7.3.1 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, Melillo, & Peterson, 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.

#### **4.7.3.2 CLIMATE CHANGE AND THE SOUTH ATLANTIC OCEAN**

With the large degree of uncertainty on the impact of climate change to marine mammals in the South Atlantic Ocean, 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**

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**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Silver Spring, MD 20910

**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  
OVER THE MID-ATLANTIC RIDGE IN THE SOUTH ATLANTIC OCEAN, JANUARY – MARCH, 2016**

**NATIONAL MARINE FISHERIES SERVICE**

**BACKGROUND**

On October 30, 2015, Lamont-Doherty Earth Observatory of Columbia University (Lamont-Doherty) submitted an application to the National Oceanic and Atmospheric Administration (NOAA) requesting an Incidental Harassment Authorization (Authorization) for the possible Level B harassment of 38 species of marine mammals and possible Level A harassment of 16 species of marine mammals incidental to conducting a marine geophysical (seismic) survey over the Mid-Atlantic Ridge in the South Atlantic Ocean, for a period of three months starting in January 2016.

In response to Lamont-Doherty's request, the National Marine Fisheries Service (NMFS) proposes to issue an Authorization, which would be valid from January 4, 2016 through March 31, 2016. Acoustic stimuli associated with the seismic surveys have the potential to cause marine mammals in the vicinity of the project area to be behaviorally disturbed, and therefore, the survey activities warrant an authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. §§ 1631 *et seq.*) and the regulations governing the taking and importing of marine mammals (50 Code of Federal Regulations (CFR) Part 216). NMFS' issuance criteria for incidental take authorizations require that the taking of marine mammals authorized by an Authorization will have a negligible impact on the species or stock(s), and, where relevant, will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. In addition, the Authorization must set forth, where applicable, the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the monitoring and reporting of such takings.

In accordance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. §§ 4321 *et seq.*), the Council on Environmental Quality (CEQ) regulations (40 CFR §§ 1500-1508) and NOAA Administrative Order (NAO) 216-6 "Environmental Review Procedures for Implementing the National Environmental Policy Act," NMFS has prepared this Final Environmental Assessment (EA) titled, *Proposed Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey over the Mid-Atlantic Ridge in the South Atlantic Ocean, January – March, 2016*. NMFS proposes to issue the IHA with mitigation measures, as described in Alternative 1 of the Final EA.

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 75355, December 1, 2015);
- *Request by Lamont-Doherty Earth Observatory 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 South Atlantic Ocean, Austral Summer 2016* (LGL, 2015).
- *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the South Atlantic Ocean, January – March, 2016* (NSF, 2015).
- *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/USGS, 2011); and
- *Record of Decision for Marine Seismic Research Funded by the National Science Foundation. June, 2012* (NSF, 2012).

The EA addresses the potential environmental impacts of two alternatives to meet NMFS purpose and need under section 101(a)(5)(D) of the MMPA:

- Issue the proposed IHA to Lamont-Doherty for take, by 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 proposed survey activities would not proceed.

## ANALYSIS

NAO 216-6 contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 C.F.R. § 1508.27 state that the significance of an action should be analyzed both in terms of “context” and “intensity.” Each criterion listed is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed 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. There is no Essential Fish Habitat as defined under the Magnuson-Stevens Act in the proposed action area.

Effects on ocean and coastal habitats by Lamont-Doherty’s proposed survey and the proposed 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 marine species or their food.

- 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 incidental 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 over the Mid-Atlantic Ridge in the South Atlantic Ocean. We do not expect our proposed action of issuance of an Authorization to Lamont-Doherty 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 38 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 harassment (in the form of short-term and localized changes in behavior and displacement) of small numbers, relative to the population sizes, of 38 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 a substantial impact to marine mammals or to their role in the ecosystem.

The proposed seismic survey 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, sei, Southern right, and sperm whales. A January 2016 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 A or Level B harassment." We do not anticipate that take by serious injury or mortality would occur, nor have

we authorized take by serious injury or mortality. NMFS' predicted estimates for Level A harassment take for some species are likely overestimates of the injury that will occur. NMFS expects that successful implementation of the required visual and acoustic mitigation measures would avoid Level A take in some instances. Also, NMFS expects that some individuals would avoid the source at levels expected to result in injury. We anticipate that any PTS incurred, would be in the form of only a small degree of permanent threshold shift and not total deafness. Thus, 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 we have reviewed to ensure that the authorized activities have a negligible impact on marine mammals.

NMFS received comments from the Marine Mammal Commission and we fully considered all their comments in preparing the proposed Authorization and the EA. 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 result in substantial impacts to 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 ocean habitat from Lamont-Doherty's action would likely be 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 the Mediterranean Sea and conducted NEPA analysis on those projects. 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 impacts of the issuance of an Authorization for the take of marine mammals incidental to the conduct of a 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 South Atlantic Ocean; and (c) climate change.

The proposed action of Lamont-Doherty conducting the survey over the Mid-Atlantic Ridge in the South Atlantic Ocean and our proposed action of issuing an Authorization to Lamont-Doherty for the incidental take of a small number of marine mammals are interrelated. The survey conducted pursuant to the requirements of an Authorization authorizing 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 unaware of any other research seismic surveys scheduled for the South Atlantic Ocean. Also, 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 over the Mid-Atlantic Ridge in the South 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)(D) 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, and, where relevant, will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. 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?**



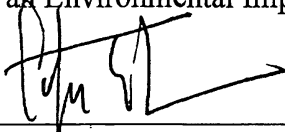
**Response:** The proposed action would not result in any significant cumulative adverse effects on target or non-target species incidentally taken by harassment due to seismic survey activities.

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 28 days), the action would not result in synergistic, or cumulative adverse effects that could have a substantial effect on any species.

**DETERMINATION**

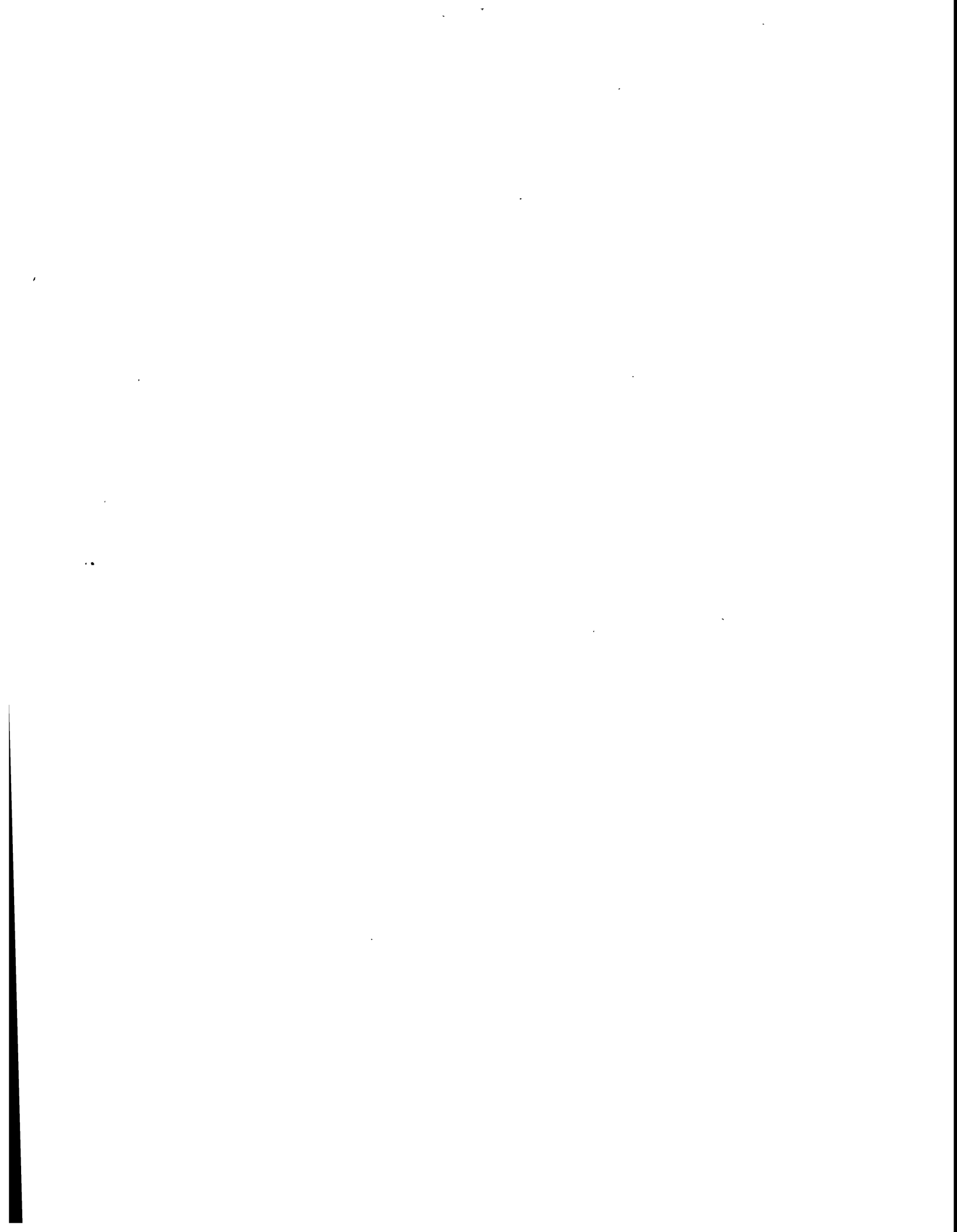
In view of the information presented in this document and the analysis contained in the supporting Final EA prepared by NMFS, it is hereby determined that the issuance of an Authorization for the take, by harassment, of small numbers of marine mammals incidental to the conduct of seismic surveys in accordance with Alternative 1 (Preferred Alternative) will not significantly impact the quality of the human environment. 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.



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

12/30/15

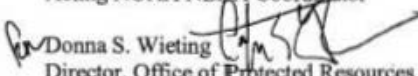
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Date





MEMORANDUM FOR: Kristen A. Tronvig  
Acting NOAA NEPA Coordinator

DEC 31 2015

FROM: Donna S. Wieting   
Director, Office of Protected Resources

SUBJECT: Finding of No Significant Impact for the Environmental Assessment on the Proposed Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey over the Mid-Atlantic Ridge in the South Atlantic Ocean, January - March, 2016—DECISION MEMORANDUM

Based on the subject environmental assessment, I have determined that no significant environmental impacts will result from the proposed action. I request your concurrence in this determination by signing below. Please return this memorandum for our files.

TRONVIG, KRISTEN, A. 136588601

Digitally signed by TRONVIG, KRISTEN, A. 136588601  
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c=US, email=TRONVIG, KRISTEN, A. 136588601  
Date: 2015.01.04 09:49:04 -05'00'

1. I concur. 2  
NOAA NEPA Coordinator Date

2. I do not concur. \_\_\_\_\_  
NOAA NEPA Coordinator Date

Attachments

