PROPOSED ACTION:	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.
TYPE OF STATEMENT:	Environmental Assessment
LEAD AGENCY:	U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Marine Fisheries Service
RESPONSIBLE OFFICIAL:	Helen M. Golde, Acting Director, Office of Protected Resources, National Marine Fisheries Service
FOR FURTHER INFORMATION:	Jeannine Cody National Marine Fisheries Service Office of Protected Resources, Permits and Conservation Division 1315 East West Highway Silver Spring, MD 20910 301-427-8401
LOCATION:	International waters approximately 300 kilometers (186.4 miles) offshore of Pico and Faial Islands, Azores in the northwest Atlantic Ocean.
ABSTRACT:	This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division's proposal to issue an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory for the taking, by Level B harassment, of small numbers of marine mammals, incidental to conducting a marine geophysical survey on the Mid-Atlantic Ridge in the Atlantic Ocean, April - June, 2013.

CONTENTS

List of Abbreviations or Acronyms **3**

Executive Summary **4**

Chapter 1 – Introduction and Purpose and Need **7**
1.1 Description of Proposed Action 7
1.1.1 Background on the Applicant's MMPA Application 8
1.1.2 Marine Mammals in the Action Area 8
1.2 Purpose and Need 9
1.2.1 Purpose of Action 9
1.2.2 Need for Action 10
1.3 The Environmental Review Process 10
1.3.1 Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope 11
1.3.2 Scope of Environmental Analysis 13
1.3.3 NEPA Public Scoping Summary 14
1.3.4 Relevant Comments on the Foundation's Analysis 15
1.3.5 Relevant Comments on our *Federal Register* Notice 15
1.4 Other Permits, Licenses, or Consultation Requirements 16
1.4.1 U.S. Endangered Species Act of 1973 16
1.4.2 E.O. 12114: Environmental Effects Abroad of Major Federal Actions. 17

Chapter 2 – Alternatives Including the Proposed Action **18**
2.1 Introduction 18
2.2 Description of the Observatory's Proposed Seismic Survey 19
2.2.1 Specified time and Specified area 20
2.2.2 Seismic Acquisition and Active Acoustic Operations 20
2.3 Description of Alternatives 21
2.3.1 Alternative 1 – Issuance of an Authorization with Mitigation Measures 21
2.3.2 Alternative 2 – No Action 24
2.3.3 Alternatives Considered but Eliminated from Detailed Study 24

Chapter 3 – Affected Environment **26**
3.1 Physical Environment 26
3.1.1 Marine Mammal Habitat 26
3.2 Biological Environment 26
3.2.1 Marine Mammals 26

Chapter 4 – Environmental Consequences **27**
4.1 Effects of Alternative 1 – Issuance of an Authorization with Mitigation 27
4.1.1 Impacts to Marine Mammal Habitat 27
4.1.2 Impacts to Marine Mammals 27
4.2 Effects of Alternative 2– No Action Alternative 31
4.2.2 Impacts to Marine Mammals 31
4.3 Compliance with Necessary Laws – Necessary Federal Permits 32
4.4 Unavoidable Adverse Impacts 32
4.5 Cumulative Effects 32
4.5.1 Past, Present, and reasonably Foreseeable Future Seismic Surveys on the Mid-Atlantic Ridge 33
4.5.2 Vessel Traffic and Vessel Noise 34
4.5.3 Fishing 34

Chapter 5 – List of Preparers and Agencies Consulted **35**

Chapter 6 – References **36**

LIST OF ABBREVIATIONS OR ACRONYMS

2-D	two-dimensional
3-D	three-dimensional
AEP	auditory evoked potential
BiOp	Biological Opinion
CFR	Code of Federal Regulations
Commission	The Marine Mammal Commission
dB	decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.)
FONSI	Finding of No Significant Impact
Foundation	National Science Foundation
FR	*Federal Register*
ft	feet
IHA	Incidental Harassment Authorization
ITS	Incidental Take Statement
km	kilometer
km/hr	kilometer per hour
kts	knots
Langseth	R/V *Marcus G. Langseth*
L-DEO	Lamont-Doherty Earth Observatory
m	meter
mi	mile
mph	miles per hour
MMPA	Mammal Protection Act of 1972, as amended (16 U.S.C. 1631 *et seq*.)
µPa	microPascal
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq*.)
NMFS	National Marine Fisheries Service
nmi	nautical miles
NOAA	National Oceanographic and Atmospheric Administration
PSO	Protected Species Observer

EXECUTIVE SUMMARY

The National Marine Fisheries Service (NMFS), Office of Protected Resources, Permits and Conservation Division has prepared this environmental assessment (EA) pursuant to the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.), the Council on Environmental Quality regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order 216-6.

ES.1 Description of the Proposed Action

We (National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division) propose to issue an Incidental Harassment Authorization (Authorization) to Lamont-Doherty Earth Observatory of Columbia University (the Observatory) under the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 *et seq*.) for the incidental taking of small numbers of marine mammals, incidental to the conduct of a marine geophysical (seismic) survey in international waters approximately 300 kilometers (186.4 miles) offshore of Pico and Faial Islands, Azores in the northwest Atlantic Ocean, April through June, 2013. We do not have the authority to permit, authorize, or prohibit the Observatory's seismic survey in the northwest Atlantic Ocean.

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

ES.2 Scope of this Environmental Assessment

This EA titled, *Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey in the Atlantic Ocean, April - June, 2013,* focuses primarily on the environmental effects of authorizing the take of marine mammals incidental to the Observatory's activities.

To evaluate the effects of conducting the marine geophysical (seismic) survey in the Atlantic ocean during a period between April and May, 2013, the National Science Foundation (Foundation) has prepared a *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013.* We do not duplicate their analysis; rather we incorporate it by reference as explained further in this document. The Foundation's 2013 analysis tiers to the 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011) which considers all impacts of conducting a seismic survey. We incorporate the 2011 programmatic EIS by reference. Last, we published a notice for the proposed Authorization in the *Federal Register* (78 FR 10137, February 13, 2013; (NMFS, 2013)) which provided a detailed description of the proposed seismic survey and environmental information and issues related to it. We also incorporate that notice by reference.

We have prepared this EA to assist in determining whether the direct, indirect, and cumulative impacts related to our issuance of an Authorization under the MMPA for marine mammals for the Observatory's survey is likely to result in significant impacts to the human or natural environment. This EA is intended to inform our decision on issuing the Authorization. While the focus of this EA

is on the effects caused by the proposed issuance of an Authorization, in combining this analysis with the analyses in the previously referenced documents, we have considered all impacts associated with the underlying action which is the full suite of activities conducted for their proposed seismic survey. We anticipate the issuance of an Authorization to take small numbers of marine mammals incidental to the Observatory's specified activities in a specific geographic region to affect marine mammals and their habitat.

Our NEPA analysis further evaluates effects to marine mammals and their habitat due to the specific scope of the decision for which we are responsible (*i.e.*, whether or not to issue the Incidental Harassment Authorization which includes prescribed means of incidental take, mitigation measures, and monitoring requirements). Our review of public comments submitted in response to our notice for the proposed Authorization in the *Federal Register* (78 FR 10137, February 13, 2013) did not reveal additional environmental impacts or issues requiring analysis in this EA.

ES.3 Alternatives

Our Proposed Action (Preferred Alternative) represents the Authorization of take incidental to the applicant's seismic survey, along with required monitoring and mitigation measures for marine mammals that would minimize potential adverse environmental impacts. The Authorization includes prescribed means of incidental take, mitigation and monitoring measures, and reporting requirements.

For the No Action Alternative, we would not issue an Incidental Harassment Authorization to the Observatory for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the seismic survey.

- The No Action Alternative also includes the full suite of activities conducted by the Observatory for the seismic survey. Because we do not have the authority to permit, authorize, or prohibit the seismic surveys themselves, the Observatory may decide to: (1) continue with the seismic survey with the inclusion of mitigation and monitoring measures sufficient to preclude any incidental take of marine mammals; (2) continue the seismic survey and be in violation of the MMPA if take of marine mammals occurs; or (3) choose not to conduct the seismic survey.
- For purposes of this NEPA analysis, however, we characterize no action as the applicant's implementation of the proposed seismic survey without the mitigation and monitoring measures for marine mammals prescribed in the Authorization for incidental take in order to sharply compare and contrast alternatives.

ES.4 Environmental Impacts of the Proposed Action

The Observatory's proposed seismic survey activities would involve active acoustics that have the potential to cause marine mammals to be behaviorally disturbed.

- 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.
- Thus, the action alternative includes a suite of mitigation measures intended to minimize potentially adverse interactions with marine mammals and their habitat. We acknowledge that the incidental take authorized by the Authorization would potentially result in insignificant, unavoidable adverse impacts. However, we believe that the issuance of an

Authorization would not have any adverse cumulative effects on marine mammal species or their habitats.

The analysis in this EA, including the documents we incorporate by reference, serve as the basis for determining whether our issuance of an Incidental Harassment Authorization to the Observatory for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of marine seismic survey on the Mid-Atlantic Ridge in the Atlantic Ocean, April through June, 2013 would result in significant impacts to the human environment.

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.) prohibits the incidental taking of marine mammals. For a marine mammal to be incidentally taken, it is either killed, seriously injured, or harassed. The MMPA 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 to the MMPA's prohibition on take such as the authority at issue here for us to authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided certain statutory and regulatory procedures are met and determinations made. We describe this exception set forth in the MMPA at Section 101(a)(5)(D) in more detail in Section 1.2.

We (National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division) propose to issue an Incidental Harassment Authorization (Authorization) to Lamont-Doherty Earth Observatory of Columbia University (the Observatory) under the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 *et seq*.) for the incidental taking of small numbers of marine mammals, incidental to the conduct of a marine geophysical (seismic) survey in international waters approximately 300 kilometers (186.4 miles) offshore of Pico and Faial Islands, Azores in the northwest Atlantic Ocean, April through June, 2013. We do not have the authority to authorize or prohibit the Observatory's seismic survey in the northwest Atlantic Ocean.

Our proposed action is triggered by the Observatory requesting an Authorization to take marine mammals incidental to conducting the proposed marine seismic survey within international waters in the Atlantic Ocean offshore the Azores. The Observatory's seismic survey activities have the potential to cause marine mammals to be behaviorally disturbed by exposing them to elevated levels of sound which, as we have explained, is anticipated to result in take that would otherwise be prohibited by the MMPA. The Observatory therefore requires an Authorization for incidental take and has requested that we provide it through the issuance of an Incidental Harassment Authorization under section 101(a)(5)(D) of the MMPA. Our issuance of an Authorization to the Observatory 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, we are required to analyze the effects on the human environment and determine whether they are significant such that preparation of an Environmental Impact Statement (EIS) is necessary.

This EA titled, *Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey in the Atlantic Ocean, April - June, 2013*, addresses the potential environmental impacts of two choices available under section 101(a)(5)(D) of the MMPA, namely:

- Issue the Incidental Harassment Authorization (Authorization) to the Observatory for Level B harassment take of marine mammals under the MMPA during the seismic survey, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the Authorization; or
- Not issue an Incidental Harassment Authorization to the Observatory in which case, for the purposes of NEPA analysis only, we assume the activities would proceed and cause

incidental take without the mitigation and monitoring measures prescribed in the Authorization.

1.1.1 BACKGROUND ON THE APPLICANT'S MMPA APPLICATION

The Observatory proposes to use the R/V *Marcus G. Langseth* (*Langseth*), a 235-feet (ft) (71.6 meters (m)) research vessel owned by the National Science Foundation (Foundation) and operated under a cooperative agreement with the Observatory, to conduct a combination of high resolution seismic tomography, multichannel reflection and micro-earthquake modeling define the relationship between magmatism, faulting, substrate lithology (rock types) and hydrothermal circulation at the Rainbow Hydrothermal Field on the Mid Atlantic Ridge.

The Foundation 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). The Foundation 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. In 2012, a Foundation-expert panel recommended a research proposal titled, *Collaborative Research: Seismic Investigation of the Rainbow Hydrothermal Field and its Tectono/magmatic Setting, Mid-Atlantic Ridge 36 Degrees 14' N* (Award #0961680) for funding and ship time on the *Langseth*. As the federal action agency, the Foundation has funded the Observatory's proposed seismic survey in the Atlantic Ocean, April through June, 2013 as a part of the NSF Act of 1950. We describe the Foundation-support seismic survey in more detail in Section 2.2.

1.1.2 MARINE MAMMALS IN THE ACTION AREA

On January 17, 2013, we received a final application from the Observatory, which reflected updates to the mitigation safety zones, incidental take requests for marine mammals, and information on marine protected areas. Marine mammals under our jurisdiction that could be adversely affected by the proposed seismic survey include:

Mysticetes

- Blue whale (*Balaenoptera musculus*)
- Bryde's whale (*Balaenoptera edeni*)
- Fin whale (*B. physalus*)
- Humpback whale (*Megaptera novaeangliae*)
- North Atlantic right whale (*Eubalena glacialis*)
- Minke whale (*B. acutorostrata*)
- Sei whale (*B. borealis*)

Odontocetes

- Atlantic spotted dolphin (*Stenella frontalis*)
- Blainville's beaked whale (Mesoplodon densirostris)
- Common bottlenose dolphin (*Tursiops truncatus*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Dwarf sperm whale (*Kogia sima*)
- False killer whale (*Pseudorca crassidens*)
- Gervais beaked whale (*M. europaeus*)
- Long-finned pilot whale (*Globicephala melas*)
- Mesoplodont beaked whales (*Mesoplodon spp.*)
- Killer whale (*Orcinus orca*)
- N. bottlenose whale (Hyperoodon ampullatus)
- Pantropical spotted dolphin (*Stenella attenuata*)
- Pygmy killer whale (*Feresa attenuata*)
- Pygmy sperm whale (*Kogia breviceps*)
- Risso's dolphin (*Grampus griseus*)
- Rough-toothed dolphin (*Steno bredanensis*)
- Short-beaked common dolphin (*D. delphis*)
- Short-finned pilot whale (*G. macrorhynchus*)
- Sowerby's beaked whale (*M. bidens*)
- Sperm whale (*Physeter macrocephalus*)
- Striped dolphin (*S. coeruleoalba*)
- True's beaked whale (*M. mirus*)

1.2 PURPOSE AND NEED

The MMPA and Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.) prohibit "takes" of marine mammals and of threatened and endangered species, respectively, with only a few specific exceptions. The applicable exceptions in this case are an exemption for incidental take of marine mammals in sections 101(a)(5)(D) of the MMPA and 7(o)(2) of the ESA.

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 we make certain findings and provide a notice of a proposed authorization to the public for review. Entities seeking to obtain authorization for the incidental take of marine mammals under our jurisdiction must submit such a request (in the form of an application) to us. Section 101(a)(5)(D) of the MMPA also establishes a 45-day time limit for our review of the application for an Authorization followed by a 30-day public notice and comment period on any proposed authorization for the incidental harassment of small numbers of marine mammals. Within 45 days of the close of the public comment period, we must either issue or deny the Authorization.

In the case of a Federal action that may affect marine mammal species listed as threatened or endangered under the ESA, the action agency responsible for funding, authorizing or carrying out the action must consult with NMFS under Section 7 of the ESA to ensure that its action is not likely to jeopardize a listed species or result in the adverse modification or destruction of any designated critical habitat. The Section 7 consultation process for this action is described in Section 1.4.1. Consultation is completed when NMFS issues a Biological Opinion (Opinion). The Opinion includes, among other things, an Incidental Take Statement (ITS) which must specify mitigation measures included in an Incidental Take Authorization for listed marine mammal species. Any incidental take that occurs consistent with the terms and conditions in the ITS is not considered prohibited take under the ESA and is thus exempted.

We have promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 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 permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA. Applications for an Authorization must be submitted according to regulations at 50 CFR § 216.104.

1.2.1 PURPOSE OF ACTION

The primary purpose of our proposed action—the issuance of an Authorization to the Observatory—is to authorize (pursuant to the MMPA) the Foundation's request for the take of marine mammals incidental to the Observatory's proposed activities. The Authorization, if issued, would provide an exception to the Observatory from the take prohibitions contained in the MMPA and would allow take of marine mammals, incidental to the conduct of the seismic survey from April through June, 2013. To authorize the take of small numbers of marine mammals in accordance with Section 101(a)(5)(D) of the MMPA, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and have an unmitigable impact on the availability of affected marine mammal species for subsistence use. We cannot issue an authorization if it would result in more than a negligible impact on marine mammals or stocks or result in an unmitigable impact on

subsistence. The statute also establishes substantive requirements. We must set forth the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat (i.e. mitigation), paying particular attention to rookeries, mating grounds, and areas of similar significance. If appropriate, we must prescribe 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 in large part to better understand the effects of such taking on the species. A proposed Authorization must be published in the *Federal Register* for public notice and comment. The purpose of this action is therefore to fashion an Authorization that meets statutory and regulatory requirements if it is feasible to do so.

1.2.2 NEED FOR ACTION

As noted above this section, the MMPA establishes a general moratorium or prohibition on the take of marine mammals, including take by Level B (behavioral) harassment. The MMPA establishes a process discussed in Section 1.2.1 by which individuals engaged in specified activities within a specified geographic area may request an Incidental Harassment Authorization for the incidental tale of small numbers of marine mammals.

On January 17, 2013, the Observatory submitted an application demonstrating both the need and potential eligibility for issuance of an Incidental Harassment Authorization in connection with the seismic cruise described in Section 1.1.1. We now have a corresponding duty to determine whether and how we can fashion an Authorization authorizing take by Level B harassment incidental to the activities described in the Observatory's application. The need for this action is therefore established and framed by the MMPA and our responsibilities under section 101(a)(5)(D) of the MMPA, its implementing regulations, and other applicable requirements which will influence our decision making, such as section 7 of the ESA which is discussed in more detail below this section. In order for an alternative to be considered reasonable it must meet the statutory and regulatory requirements. The previously mentioned purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects. We are thus developing and analyzing alternative means of developing and issuing an Authorization, not alternative means of the applicant carrying out the underlying activities described in its application. We do recognize though that mitigation measures developed and included in a final Authorization might affect those activities.

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 that are fully or partially funded, regulated, conducted, 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 and incidental to the applicant's activities, we consider this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6, the proposed issuance of authorization for incidental take of marine mammals is an action that is not categorically excluded from NEPA review. Similar actions do not normally require an Environmental Impact Statement (EIS). Therefore, we prepared this EA to determine whether the direct, indirect and cumulative impacts related to its issuance of the

authorization for incidental take of marine mammals under the MMPA during seismic surveys in international waters in the northwest Atlantic Ocean are likely to be significant. If we deem 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

We have based the scope of the proposed action and nature of the two alternatives (*i.e.*, whether or not to issue the Incidental Harassment Authorization including prescribed means of take, mitigation measures, and monitoring requirements) considered in this EA on the relevant requirements in section 101(a)(5)(D) of the MMPA. The scope of our analysis is thus bounded by our decision making discussed in Section 1.3.2. We believe this analysis, when combined with the analysis in the Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the Mid-Atlantic Ridge, April–May, 2013* (LGL, 2013); The Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013* (LGL, 2013) and their 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011) fully evaluate the impacts associated with this survey with mitigation and monitoring for marine mammals.

MMPA APPLICATION AND NOTICE OF THE PROPOSED IHA

The MMPA and its implementing regulations governing the issuance of an Incidental Harassment Authorization (50 CFR § 216.107) require that upon receipt of an adequate and complete application for an IHA, we must publish a notice of preliminary determinations and a proposed Authorization in the *Federal Register* (FR) within 45 days.

The regulations published by the Council on Environ Environmental Quality (CEQ regulations) 40 CFR §1502.25 encourage Federal agencies to integrate NEPA's environmental review process with other environmental review laws. We rely substantially on the public process for developing proposed Authorizations under the MMPA and its implementing regulations to develop and evaluate 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 IHA during the corresponding NEPA review process.

On February 13, 2013, we published a notice of a proposed Incidental Harassment Authorization with our preliminary determinations in the *Federal Register* (78 FR 10137). The notice included a detailed description of the revised proposed action resulting from the MMPA consultation process; consideration of environmental issues and impacts of relevance related to the issuance of an Authorization; and potential mitigation and monitoring measures to avoid and minimize potential adverse impacts to marine mammals and their habitat. We explained in that notice that we would use it to provide all relevant environmental information to the public and to solicit the public's comments on the potential environmental effects related to the proposed issuance of the Authorization and issues for consideration in this EA.

This EA titled, *Issuance of an Incidental Harassment Authorization to Lamont-Doherty Earth Observatory to Take Maine Mammals by Harassment Incidental to a Marine Geophysical Survey*

in the Atlantic Ocean, April - June, 2013, incorporates by reference and relies on the Observatory's January 2013 application, our notice of a proposed Authorization (78 FR 10137, February 13, 2013), and their environmental analyses by reference to avoid duplication of analysis and unnecessary length.

Our notice of a proposed Authorization (78 FR 10137, February 13, 2013) included a detailed description of the proposed project, an assessment of the potential impacts on marine mammals, mitigation and monitoring measures, reporting requirements planned for this project and preliminary determinations required by the MMPA. The notice provided information on our proposal to issue an Authorization to the Observatory to incidentally harass by Level B harassment only, 28 species of marine mammals during the proposed 20-day seismic survey. Within the notice of the proposed Authorization (78 FR 10137, February 13, 2013) we considered the applicant's proposed action and their proposed mitigation and monitoring measures that would effect the least practicable impact on marine mammals including: (1) vessel-based visual mitigation monitoring; (2) proposed exclusion zones; (3) power-down procedures; (4) shutdown procedures; (5) ramp-up procedures; and (6) speed and course alterations. We preliminarily determined, provided that the Observatory implemented the required mitigation and monitoring measures, that the impact of conducting a proposed survey on the Mid-Atlantic Ridge in the north Atlantic Ocean in international waters, from April 2013 through June, 2013, would result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals.

PROPOSING FEDERAL AGENCY'S NEPA ANALYSIS ON THE PROPOSED SEISMIC SURVEY AND ISSUANCE OF AN ASSOCIATED AUTHORIZATION

The Foundation—which owns the research vessel that would serve as the operational platform for the seismic survey—directed LGL Ltd., environmental research associates to prepare an environmental analysis (analysis) titled, *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the Mid-Atlantic Ridge, April–May 201*3 (LGL, 2013) to meet their requirements under Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, for the Foundation's proposed federal action. The Foundation's 2013 analysis tiers to the *2011 Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011) and their Record of Decision.

In addition, the Foundation prepared an Environmental Assessment, titled *Environmental Assessment of Lamont-Doherty Earth Observatory's marine seismic surveys in the Mid-Atlantic Ocean. LGL Rep. TA2822-9* (LGL, 2003), per NEPA for a Foundation-funded seismic survey conducted by the R/V *Maurice Ewing* (*Ewing*), at a nearby site in the Mid-Atlantic Ocean, October - November, 2003. Although the airgun configuration and source levels were different in the survey conducted by the *Ewing* than those currently proposed by the Observatory, the Foundation's analysis conclusions are similar in that no significant impacts were anticipated by the proposed activities. The *Ewing's* crew observed no marine mammals during the seismic operations or during transit to and from the survey sites, which appeared to confirm anticipated low densities of species in the survey area and limited impacts, if any, of the activities. The Foundation incorporates their 2003 EA into their 2013 environmental analysis by reference.

After conducting an independent review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on the Observatory'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):

- The Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013*, prepared by LGL Ltd., environmental research associates (LGL, 2013); and
- The Foundation's 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011).

The Foundation's 2013 environmental analysis (LGL, 2013) contains a description of the Observatory's proposed seismic survey, proposed mitigation measures, and issuance of an Authorization (Section II); and a discussion of the affected environment and environmental consequences (Section IV) (LGL, 2013). The Foundation's 2011 Programmatic EIS (NSF, 2011) also considers, in a qualitative way (Section 2.3.1.2), the affected environment and environmental consequences of conducting a seismic survey in the Mid-Atlantic Ocean including impacts on marine invertebrates (Section 3.2), fish (Section 3.3), sea turtles (Section 3.4), sea birds (Section 3.5), and marine mammals (Section 3.6); collision, entanglement, and ingestion (Sections 3.4.4.4; 3.5.4.4; and 3.5.5.2); and discharges of pollutants (Section 4.3.8). In summary, the Foundation's analyses conclude that with incorporation of monitoring and mitigation measures proposed by the Observatory, the potential impacts of the proposed action to marine mammals would be would be limited to localized changes in behavior and distribution near the seismic vessel and would qualify as Level B harassment under the MMPA. The Foundation did not identify any significant environmental issues or impacts.

1.3.2 SCOPE OF ENVIRONMENTAL ANALYSIS

Given the limited scope of the decision for which we are responsible (*i.e.* whether or not to issue the authorization which includes prescribed means of take, mitigation measures and monitoring requirements) this EA (relying on the environmental review and analyses performed by the Foundation, the application and the notice of proposed Authorization collectively incorporated by reference herein) is intended to provide more focused information on the primary issues and impacts of environmental concern related specifically to our issuance of the Incidental Harassment Authorization authorizing the take of marine mammals incidental the Observatory's activities and mitigation measures to minimize the effects of that take. For these reasons, this EA does not further evaluate effects to the elements of the human environment listed in Table 1.

Table 1. Components of the human environment not requiring further evaluation.

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

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, we requested comments on the potential environmental impacts described in the MMPA application and in the *Federal Register* notice of the proposed Authorization (78 FR 10137, February 13, 2013). The CEQ regulations further encourage agencies to integrate the NEPA review process with review under the environmental statutes. Consistent with agency practice we integrated our NEPA review and preparation of this EA with the public process required by the MMPA for issuance of an Authorization.

The *Federal Register* notice of the proposed Authorization with our preliminary determinations (78 FR 10137, February 13, 2013), supporting analyses, and corresponding public comment period are instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments to us for consideration in both the MMPA and NEPA decision-making processes.

The *Federal Register* notice of the proposed Authorization (78 FR 10137, February 13, 2013) summarized our purpose and need; included a statement that we would prepare an EA for the proposed action; and invited interested parties to submit written comments concerning the application and our preliminary analyses and findings including those relevant to consideration in the EA. The notice of the proposed Authorization was available for public review and comment from February 13, 2013 to March 15, 2013.

This process served the public participation function for this EA in terms of scoping for the action and providing the public a meaningful opportunity to participate in the environmental decision-making process. In addition, we posted the Foundation's analysis on our website at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications concurrently with the release of our Federal Register notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013). This EA does not expand the scope of environmental issues and impacts for consideration and is based primarily on the information included in in our Federal Register notice (78 FR 10137, February 13, 2013), the documents it references, and the public comments provided in response. Therefore, we did not release a draft of this EA for additional review based on our determination that its release would neither yield additional information to inform our decision making, nor provide for more meaningful public involvement. At the conclusion this process, we will post the final EA, and, if appropriate, FONSI, on the same website.

1.3.4 RELEVANT COMMENTS ON THE FOUNDATION'S ANALYSIS

The Foundation did not release their environmental analysis to the public. As such, they received no public comments. However, we posted the Foundation's analysis on our website at http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications concurrently with the release of our *Federal Register* notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013). We evaluate and address relevant public comments that we received in response to the notice in Chapters 2, 3, and 4 of this EA. We will also address them in the *Federal Register* notice announcing issuance of the Authorization, should we determine to issue the Authorization.

1.3.5 RELEVANT COMMENTS ON OUR *FEDERAL REGISTER* NOTICE

During the 30-day public comment period on the notice of the proposed Authorization (78 FR 10137, February 13, 2013) we received comments from one individual. Public comments on the notice of the proposed Authorization postmarked by March 15, 2013 are a part of the public record and are available on our website. The comments related to the potential environmental impacts associated with our authorizing potential take of marine mammals incidental to the Observatory's action include:

- A request to deny the issuance of the Authorization to the Observatory because (s)he believed that the activity would kill marine mammals in the survey area.

On March 11, 2013 we received comments from the Marine Mammal Commission (Commission) on the notice of the proposed Authorization (78 FR 10137, February 13, 2013). The Commission provides comments on all proposed Incidental Take Authorizations as part of their established role under the MMPA (§ 202 (a)(2), "*humane means of taking marine mammals*").

We briefly summarize the Commission's comments here. Generally, the Commission recommended that we:

- Require the Observatory to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals for the mitigation airgun using a model that incorporates site-specific information.
- Explain the rationale for basing the exclusion and buffer zones for the mitigation airgun on modeling results based on measurements made in the Gulf of Mexico.

- Prohibit an 8-minute pause following the sighting of a marine mammal in the exclusion zone that has not been seen to exit the exclusion zone and extend that pause to cover the maximum dive times of the species likely to be encountered prior to resuming airgun operations after both power-down and shut-down procedures.
- Base our take determinations on the estimated mean number of individuals that includes a measure of uncertainty or on the estimated maximum number of each species.
- Provide additional justification that the proposed vessel-based monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones.
- Work with Foundation to analyze the data collected during ramp-up procedures to help determine the effectiveness of those procedures as a mitigation measure for seismic surveys.

We have considered the comments regarding monitoring and mitigation measures within the context of the MMPA requirement to effect the least practicable impact to marine mammals and their habitats. We have developed responses to specific comments related to the incidental harassment of marine mammals; will provide those responses in the *Federal Register* notice announcing the issuance of the Authorization; and address them in Chapters 2, 3, and 4 of this EA. We fully considered the Commission's comments, particularly those related to mitigation, monitoring, and adaptive management measures in preparing the final Authorization and this EA.

Based on those comments, we have re-evaluated the mitigation and monitoring proposed for incorporation in the Authorization and have determined, based on the best available data that the mitigation measures proposed by the applicant are the most feasible and effective monitoring and mitigation measures to achieve the MMPA requirement of effecting the least practicable impact on each marine mammal species or stock. Public comments therefore did not reveal additional feasible means of effective mitigation for the proposed action.

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.

1.4.1 U.S. ENDANGERED SPECIES ACT OF 1973

Section 7 of the ESA requires consultation for actions funded, authorized or carried out by federal agencies (i.e. federal actions) that may affect a species listed as threatened or endangered or that may affect designated critical habitat under the ESA. The regulations at 50 CFR § 402 specify the requirements for these consultations with the National Marine Fisheries Service.

The Foundation has requested authorization for the incidental take of the following marine mammals that are listed as endangered under the ESA under our jurisdiction: the blue, fin, humpback, north Atlantic right, sei, and sperm whales. Under section 7 of the ESA, the Foundation, the lead Federal agency which owns and operates the *Langseth*, has conducted a formal consultation with the National Marine Fisheries Service, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this proposed seismic survey.

Likewise, our issuance of an Incidental Harassment Authorization is an interrelated federal action that is also subject to the requirements of section 7 of the ESA. As a result, we are required to ensure that the action of our issuance of an Authorization to the Observatory is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. In order for us to authorize the incidental take of blue, fin, humpback, north Atlantic right, sei, and sperm whales, we have also conducted a concurrent formal consultation with the Office of Protected Resources, Endangered Species Act Interagency Cooperation Division.

The formal consultation under section 7 of the ESA will conclude with a single Biological Opinion for the National Science Foundation's Division of Ocean Sciences and to the National Marine Fisheries Service's Office of Protected Resources, Permits and Conservation Division for the seismic cruise and associated Authorization.

1.4.2 E.O. 12114: ENVIRONMENTAL EFFECTS ABROAD OF MAJOR FEDERAL ACTIONS.

The requirements for Executive Order (E.O.) 12114, discussed in the Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013*(LGL, 2013) and their 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011). 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, the Foundation 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 EEZ's of foreign nations. .

CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

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 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, as we previously explained, an alternative will only meet 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 criteria. We evaluated each potential alternative against these criteria. 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.[1]

We did not carry forward alternatives that we considered not reasonable for detailed evaluation in this EA. Section 2.3.4 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.

As described in Section 1.2.1, we must prescribe the means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider the Observatory's proposed mitigation measures, as well as other potential measures, and assess the benefit of the considered measures to the potentially affected species or stocks and their habitat. Our 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, the successful implementation of the measure is expected 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 us 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);

[1] 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 "No action" alternative. In this case, the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity to proceed (NEPA; Section 1502.14(d)). NEPA Sec. 1508.23 states that an agency subject to the Act has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated.

- A reduction in the number of times individual marine mammals are taken (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.

2.2 DESCRIPTION OF THE OBSERVATORY'S PROPOSED SEISMIC SURVEY

The Observatory plans to conduct a two-dimensional (2-D) seismic survey on the Mid-Atlantic Ridge in the north Atlantic Ocean (Figure 1). Specifically, the proposed survey would image the Rainbow massif to determine the characteristics of the magma body that supplies heat to the Rainbow hydrothermal field; determine the distribution of the different rock types that form the Rainbow massif; document large- and small-scale faults in the vicinity and investigate their role in controlling hydrothermal fluid discharge.

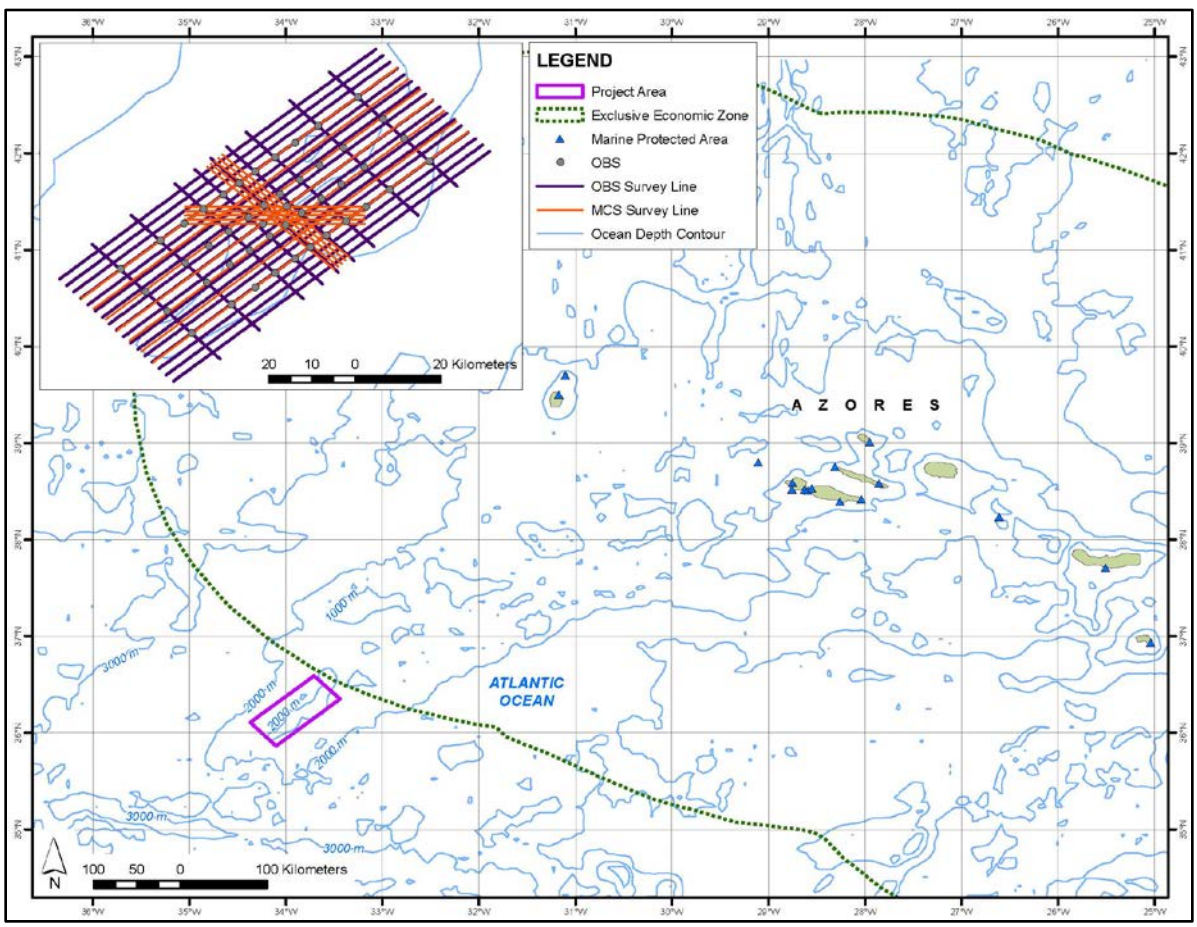

Figure 1 Proposed study area for the survey on the Mid-Atlantic Ridge in the Atlantic Ocean, April through June, 2013

2.2.1 SPECIFIED TIME AND SPECIFIED AREA

The Observatory's proposed seismic survey on the Mid-Atlantic Ridge in the north Atlantic Ocean would commence on April 8, 2013, and end on May 13, 2013. The *Langseth* would depart from St. George's, Bermuda, on April 8, 2013, and transit to the proposed survey area in international waters approximately 300 kilometers (km) (186.4 miles (mi)) offshore of Pico and Faial Islands in the Azores. At the conclusion of the proposed survey activities, the *Langseth* would arrive in Ponta Delgada, Azores on May 13, 2013. The proposed study area would encompass an area on the Mid-Atlantic Ridge bounded by the following coordinates: approximately 35.5 to 36.5° North by 33.5 to 34.5° West.

Some minor deviation from these dates is possible, depending on logistics, weather conditions, and the need to repeat some lines if data quality is substandard. Therefore, we propose to issue an authorization that is effective from April 8, 2013 to June 24, 2013.

2.2.2 SEISMIC ACQUISITION AND ACTIVE ACOUSTIC OPERATIONS

The Foundation's analysis titled, *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013*, (NSF, 2013); the Observatory's application; and our notice of the proposed Authorization (78 FR 10137, February 13, 2013) describe the survey protocols in detail. We incorporate those descriptions by reference in this EA and briefly summarize them here.

The proposed seismic survey will involve one source vessel, the *Langseth*, which would deploy an 36-airgun array, with a total volume of approximately 6,600 cubic inches (in^3). The airguns are a mixture of Bolt 1500LL and Bolt 1900LLX airguns ranging in size from 40 to 360 in^3, with a firing pressure of 1,900 pounds per square inch. The acoustic receiving system will consist of an 8-km-long (3.7 mi-long) hydrophone streamer, and 46 seismometers. The airgun array is towed through the water column along the survey lines, introducing sound into the water column. Airguns function by venting high-pressure air into the water, which creates an air bubble that transmits sounds downward through the seafloor (NSF, 2011). The sound penetrates the seafloor and returns to a receiver called a hydrophone and the reflected data provides information on sub-sea floor layers.

The array configuration consists of four identical linear strings, with 10 airguns on each string; the first and last airguns would be spaced 16 meters (m) (52 feet (ft)) apart. Of the 10 airguns, nine would fire simultaneously while the tenth airgun would serve as a spare in case of failure of one of the other airguns.

The *Langseth* would distribute the array across an area of approximately 24 x 16 m (78.7 x 52.5 ft) and would tow the array approximately 30 m (98.4 ft) behind the vessel at a tow depth of 12 m (39.4 ft) (see Figure 2-11, page 2-25 in the Foundation's *2011 Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011). During firing, the airguns would emit a brief (approximately 0.1 s) pulse of sound; during the intervening periods of operations, the airguns are silent.

The nominal source levels of the airgun arrays on the *Langseth* are 236 to 265 decibels (dB) re: 1 μPa (peak to peak) and the root mean square (rms) value for a given airgun pulse is typically 16 dB re: 1 μPa lower than the peak-to-peak value (Greene, 1997). The specific source output for the 18 airgun array is 252 dB (peak) and 259 dB (p-p). However, the difference between rms

and peak or peak-to-peak values for a given pulse depends on the frequency content and duration of the pulse, among other factors[2].

The proposed data acquisition would include approximately 480 hours of airgun operations (i.e., 20 days over 24 hours), with airgun discharges occurring on either a 3.25 minute interval with the seismometers or a 16-second interval for the multi-channel seismic portion. During firing, a brief (approximately 0.1 s) pulse sound is emitted; the airguns would be silent during the intervening periods. The dominant frequency components range from two to 188 Hertz (Hz).

The proposed study (*e.g.*, equipment testing, startup, line changes, repeat coverage of any areas, and equipment recovery) would take place in water depths ranging from approximately 900 to 3,000 m (2,952 ft to 1.9 mi). Approximately 2,565 km (1,594 mi) of the survey effort would occur in depths greater than 1,000 m (3,280 ft). The remaining effort (17 km; 10.5 mi) would occur in water depths of 100 to 1,000 m (328 to 3,280 ft). The survey will require approximately 20 days of airgun operations to complete and consist of approximately a total of 2,582 km (1.6 mi) of transect lines. The *Langseth* may conduct additional seismic operations in the survey area associated with turns, airgun testing, and repeat coverage of any areas where the initial data quality is sub-standard.

The *Langseth* would also operate a Kongsberg EM 122 multibeam echosounder and a Knudsen Chirp 320B sub-bottom profiler concurrently during airgun operations to map characteristics of the ocean floor and to provide information about the sedimentary features and bottom topography. The nominal source levels for the multibeam echosounder and sub-bottom profiler are 242 dB re: 1 μPa and 204 dB re: 1 μPa, respectively.

2.3 DESCRIPTION OF ALTERNATIVES

2.3.1 ALTERNATIVE 1 – ISSUANCE OF AN AUTHORIZATION WITH MITIGATION MEASURES

The Proposed Action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue an Incidental Harassment Authorization (valid from April through June, 2013) to the Observatory allowing the incidental take, by Level B harassment, 28 species of marine mammals during the 20-day seismic survey subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the final Authorization, if issued.

The Foundation's analyses and our *Federal Register* notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013) analyzed the potential impacts of this alternative in detail. We incorporate those analyses by reference in this EA and briefly summarize the mitigation and monitoring measures and reporting requirements likely to be incorporated in the final Authorization, if issued, in the following sections.

[2] Sound pressure is the sound force per unit area, and is usually measured in micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level (SPL) is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in underwater acoustics is 1 μPa, and the units for SPLs are dB re: 1 μPa. SPL (in decibels [dB]) = 20 log (pressure/reference pressure). SPL is an instantaneous measurement and can be expressed as the peak, the peak-peak (p-p), or the root mean square (rms). Root mean square, which is the square root of the arithmetic average of the squared instantaneous pressure values, is typically used in discussions of the effects of sounds on vertebrates and all references to SPL in this document refer to the root mean square unless otherwise noted. SPL does not take the duration of a sound into account.

We preliminarily determined, under section 101(a)(5)(D) of the MMPA that the measures included in the proposed Authorization were sufficient to reduce the effects of the Observatory's activity on marine mammals to the level of least practicable adverse impact. In addition, we preliminarily determined that the taking of small numbers of marine mammals incidental to the Observatory's action would constitute no more than a negligible impact on the relevant species or stocks (78 FR 10137, February 13, 2013).

We have not altered the mitigation, monitoring and reporting requirements to be included in the final Authorization; nor have we received any information that would cause us to change our negligible impact or small numbers determinations. Accordingly, this Preferred Alternative (Issuance of an Incidental Harassment Authorization with Mitigation Measures) would satisfy the purpose and need of our proposed action under the MMPA–issuance of an Authorization, along with required mitigation measures and monitoring, and would enable us, the Foundation and the Observatory to comply with the statutory and regulatory requirements of the MMPA and ESA.

MITIGATION AND MONITORING MEASURES

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

(1) establishment of exclusion zones to avoid injury to marine mammals and visual monitoring of the exclusion zones by Protected Species Observers (observers);
(2) power-down procedures when the observers detect marine mammals within or about to enter the exclusion zones;
(3) shut-down procedures when observers detect marine mammals within or about to enter the exclusion zones while the airgun is operating at full volume or during a power-down;
(4) ramp-up procedures;
(5) speed or course alterations to avoid marine mammals entering the exclusion zone(s); and
(6) visual and passive acoustic monitoring.

If we issue the Authorization to the Observatory, we would include mandatory requirements for them to achieve the MMPA requirement of effecting the least practicable impact on each species or stock of marine mammals.

Proposed Exclusion Zones: We have established various threshold criteria for injury and harassment that may result from exposure to acoustic stimuli. These thresholds are expressed as the root mean square of all sound amplitudes measured over the duration of an impulse with a base unit of decibels referenced to one micropascal (re: 1 µPa (rms)); the relevant thresholds for the Observatory's action are 180 dB re: 1 µPa (rms) for potential injury to cetaceans; and 160 dB re: 1 µPa (rms) for potential behavioral harassment from pulsed sounds (*e.g.*, airguns).

The Observatory will establish a 180-decibel (dB) exclusion zone (zone) for cetaceans before starting the 4-string airgun array (6,600 in3); and a 180 dB re 1 µPa (rms) exclusion zone for the single airgun (40 in3) based upon the modeled radii in their application and shown here in Table 2.

Table 2 Modeled distances to which sound levels greater than or equal to 160 and 180 dB re: 1 µPa could be received during the proposed survey over the Mid-Atlantic Ridge in the north Atlantic Ocean, during April through June, 2013.

Source and Volume (in^3)	Tow Depth (m)	Water Depth (m)	Predicted RMS Distances[1] (m)	
			160 dB	180 dB
Single Bolt airgun (40 in^3)	12	> 1,000 100 to 1,000	388 582	100 100
36-Airgun Array (6,600 in^3)	12	> 1,000 100 to 1,000	6,908 10,362	1,116 1,674

Power-Down Procedures: The Observatory would decrease the number of airguns (*i.e.*, to operating one 40 in^3 airgun) in use such that the radius of the 180-dB exclusion zone is decreased to the extent that a marine mammal(s) are no longer in or about to enter the exclusion zone. A power-down of the airgun array would also occur when the vessel is turning from one seismic line to another.

Shut-Down Procedures: The Observatory would shut-down the operating airgun(s) if they see a marine mammal within or approaching the exclusion zone for the single airgun. They would not resume airgun activity until the marine mammal(s) has cleared the exclusion zone, or until the observer is confident that the animal has left the vicinity of the vessel.

Ramp-Up Procedures: The Observatory would initiate a ramp-up procedure, beginning with the smallest airgun (*i.e.*, a single airgun, 40 in^3) in the array and adding airguns in a sequence such that the source level of the array would increase in steps not exceeding six dB per five minute period over a total duration of approximately 30 to 35 minutes when beginning operations, and after a specified period (approximately 8 minutes) of non-active airgun operations when a shut-down has exceeded that period. The Observatory has used similar periods during previous surveys.

Speed or Course Alteration: If a marine mammal(s) is detected outside the applicable exclusion zone and, based on its position and the direction of travel, is likely to enter the exclusion zone, the Observatory would consider changes of the vessel's speed if this does not compromise operational safety. For marine seismic surveys using large streamer arrays, course alterations are not typically possible. After any such speed and/or course alteration is begun, the marine mammal activities and movements relative to the seismic vessel will be closely monitored to ensure the marine mammal does not approach within the exclusion zone. If the marine mammal appears likely to enter the exclusion zone, further mitigation actions would be taken, including a power-down or shut-down of the airgun(s).

Visual Monitoring: During seismic operations, the Observatory would place at least five observers aboard the *Langseth* for the duration of the cruise. Two observers would watch for marine mammals near the vessel during daytime airgun operations (from civil twilight-dawn to civil twilight-dusk) and during any ramp-ups at night. At least one visual observer will be on watch during meal times and restroom breaks and the observer shifts would last no longer than four hours at a time.

Observers would record data to estimate the numbers of marine mammals exposed to various received sound levels and to document reactions or lack thereof. Observers would also observe during daytime periods when the seismic system is not operating for comparison of sighting rates and behavior with versus without airgun operations. They would also provide information needed to order a shut-down of the seismic source when a marine mammal is within or near the exclusion zone. The Observatory would use the data to estimate numbers of animals potentially taken by harassment (as defined in the MMPA).

Passive Acoustic Monitoring: Passive acoustic monitoring would take place 24 hours per day during airgun operations to complement the visual monitoring program. The passive acoustic monitoring would serve to alert observers (if on duty) when vocalizing marine mammals are detected. Passive acoustic monitoring is useful when marine mammals call, is monitored in real-time, and is effective either day or night, and does not depend on good visibility.

REPORTING MEASURES

The Observatory would submit a report to us and the Foundation within 90 days after the end of the cruise. The report would describe the operations that were 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 90-day report would summarize the dates and locations of seismic operations, and all marine mammal sightings (dates, times, locations, activities, associated seismic survey activities). The report would also include estimates of the number and nature of exposures that could result in takes of marine mammals by harassment or in other ways.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the Authorization (if issued), such as an injury (Level A harassment), serious injury or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), the Observatory shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources. The Observatory may not resume activities until we are able to review the circumstances of the prohibited take.

2.3.2 ALTERNATIVE 2 – NO ACTION

We are required to evaluate the No Action Alternative per CEQ NEPA regulations. The No Action Alternative serves as a baseline to compare the impacts of the Proposed Action.

Under the No Action Alternative, we would not issue an Incidental Harassment Authorization to the Observatory for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of a seismic survey in international waters approximately 300 kilometers (186.4 miles) offshore of Pico and Faial Islands, Azores in the northwest Atlantic Ocean, April through June, 2013. The Observatory would not receive an exemption from the MMPA and ESA prohibitions against the take of marine mammals. .

2.3.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

We also considered an alternative whereby we issue the Authorization for another time. However, this alternative failed to meet the statutory and regulatory requirements of the MMPA for an Authorization as the Observatory 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. Further, the Foundation in its 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013*(LGL, 2013) considered an alternative to conducting the project at another time.

The proposed dates for the cruise (April through June, 2013) are the most suitable dates that would best meet the purpose and need for the applicant, from a logistical perspective, for the Observatory, the *Langseth* and its crew, and the Foundation. Because the proposed dates for the cruise (35 days in April–May 2013) are the dates when the personnel and equipment essential to meet the overall project objectives are available, we did not consider this alternative further.

The potential environmental impacts of this alternative would be similar to the impacts of the proposed action (Alternative 1).

CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter describes existing conditions in the project area. Complete descriptions of the physical, biological, and social environment of the action area are in the Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013* (LGL, 2013) and their 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011) . We incorporate those descriptions by reference and briefly summarize or supplement the relevant sections for marine mammals in the following subchapters.

3.1 PHYSICAL ENVIRONMENT

We are required to consider impacts to the physical environment under NOAA NAO 216-6. As discussed in Chapter 1, our proposed action and alternatives relate only to the 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 subchapter 1.3.2 - Scope of Environmental Analysis). Because of the requirements of NAO 261-6, we briefly summarize the physical components of the environment here.

3.1.1 MARINE MAMMAL HABITAT

The proposed survey area is in the North Atlantic Subtropical Gyral Province, which is bounded to the west and northwest by the Gulf Stream, to the northeast at approximately 40 - 42º N by the bifurcation of the flow between the Azores Current and the North Atlantic Current, and to the south at approximately 25 - 30º N by the Subtropical Convergence (Longhurst, 2007). Within the project area the rocky and sedimentary seafloor and open water habitats support a variety of marine mammal species.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 MARINE MAMMALS

We provide information on the occurrence, distribution, population size, and conservation status for each of the species of marine mammal, including 28 marine mammal species under our jurisdiction that may occur in the proposed survey area, including seven mysticetes (baleen whales), and 21 odontocetes (toothed cetaceans) during April through June, 2013.

We presented this information earlier in Section 1.1.2 in this EA and in Tables 2 and 3 in the *Federal Register* notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013) and we incorporate those descriptions by reference here. Our agency's Stock Assessment Reports (Waring, Josephson, Fairfield-Walsh, Maze-Foley, & Rosel, 2013), http://www.nmfs.noaa.gov/pr/sars/species.htm provide the latest abundance and life history information about each stock.

All of the marine mammals are protected under the MMPA and several of these species are listed as endangered under the ESA and thus depleted under the MMPA, including the blue, fin, humpback, north Atlantic right, sei, and sperm whales.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter of the EA analyzes the impacts of the two alternatives (*i.e.*, whether or not to issue the authorization which includes prescribed means of incidental take, mitigation measures, and monitoring requirements for marine mammals only) and addresses the potential direct, indirect, and cumulative impacts of our issuance of an Authorization for Level B harassment take of marine mammals during the seismic survey. The Foundation's analyses [*i.e.*, the 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013*(LGL, 2013) and their 2011 Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (NSF, 2011)] and our *Federal Register* notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013) facilitate an 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 the Observatory's action 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 to the marine environment resulting from the Observatory's proposed action that would occur after issuance of this Authorization.

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

Alternative 1 is the Preferred Alternative under which we would issue an Incidental Harassment Authorization to the Observatory for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of a seismic survey in international waters in the northwest Atlantic Ocean, April through June, 2013. We would incorporate the mitigation and monitoring measures and reporting described earlier in this EA into a final Authorization.

The Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013* (LGL, 2013), their 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011), and our *Federal Register* notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013) describe, the potential effects of airgun sounds, multibeam echosounder and sub-bottom profiler signals on marine mammals. We incorporate those descriptions by reference and briefly summarize or supplement the relevant sections in the following subchapters.

4.1.1 IMPACTS TO MARINE MAMMAL HABITAT

Our proposed action would have no additive or incremental effect on the physical environment beyond those resulting from the cruise itself and evaluated in the referenced documents.

The effects of one seismic source vessel would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitats. The issuance of an Authorization would not affect physical habitat features, such as substrates and water quality.

4.1.2 IMPACTS TO MARINE MAMMALS

The impacts of the seismic survey on marine mammals are specifically related to acoustic activities. We expect that unavoidable impacts to each species of marine mammal that could be

encountered within the survey area would be limited to temporary behavioral responses (such as brief masking of natural sounds) and temporary changes in animal distribution. At most, we interpret these effects on marine mammals as falling within the MMPA definition of Level B (behavioral) harassment for those species managed by us.

Under Alternative 1 – Preferred Alternative, we would authorize, the incidental, Level B harassment only, in the form of temporary behavioral disturbance, of several species of cetaceans and expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment.

The Observatory, proposed a number of monitoring and mitigation measures for marine mammals as part of our evaluation for the preferred alternative. In analyzing the effects of the preferred alternative, we conclude that the Authorization's requirement of the following monitoring and mitigation measures would minimize and/or avoid impacts to marine mammals:

(1) establishment of exclusion zones to avoid injury to marine mammals and visual monitoring of the exclusion zones by Protected Species Observers (observers);
(2) power-down procedures when the observers detect marine mammals within or about to enter the exclusion zones;
(3) shut-down procedures when observers detect marine mammals within or about to enter the exclusion zones while the airgun is operating at full volume or during a power-down;
(4) ramp-up procedures;
(5) speed or course alterations to avoid marine mammals entering the exclusion zone(s); and
(6) visual and passive acoustic monitoring.

In the Observatory's application, they did not request authorization to take marine mammals by Level A Harassment because their environmental analyses estimate that marine mammals would not be exposed to levels of sound likely to result in Level A harassment (we refer the reader to Appendix B of the Foundation's NEPA document titled, 2011 Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research funded by the National Science Foundation or Conducted by the U.S. Geological Survey (NSF, 2011). Consequently, the Observatory's request for take by Level A harassment is zero animals for any species.

We do not anticipate that take by injury (Level A harassment), serious injury, or mortalities would occur and expect that harassment takes should be at the lowest level practicable due to the incorporation of the mitigation measures proposed in the Observatory's application, nor would we authorize take by injury, serious injury, or mortality.

Survey Timing: The beginning of the survey occurs before the established whale watching season for the Azores which begins in late April and continues through September, annually (Magalhães et al., 2002). Whale watching occurs in nearshore and coastal locations around the Azorean Islands which are located more than 500 km away from the survey area. We expect the activity to result in limited to temporary behavioral responses (such as brief masking of natural sounds) and temporary changes in animal distribution.

Acoustic Thresholds: We have determined that for acoustic effects, using acoustic thresholds in combination with corresponding buffer and exclusion zones are an effective way to consistently

apply measures to avoid or minimize the impacts of an action. The Observatory uses the thresholds to establish a mitigation power-down, shut-down or exclusion zone for potential acoustic injury and behavioral disturbance (*i.e.*, if an animal is about to enter or enters an area calculated to be ensonified above the level of an established threshold a sound source is powered-down or shut-down).

Vessel Strikes: The potential for striking marine mammals is a concern with vessel traffic. The probability of a ship strike resulting in an injury or mortality of an animal has been associated with ship speed; it is highly unlikely that the proposed seismic survey would result in a serious injury or mortality to any marine mammal or sea turtle as a result of vessel strike given the *Langseth's* slow survey speed (8 to 12 km/hour (km/hr); 4 to 6 knots [kts]). The Observatory has not requested authorization for take of marine mammals that might occur incidental to vessel ship strike while transiting to and from the survey site. However, the probability of marine mammal interactions occurring during transit to and from the survey area is unlikely due to the *Langseth's* slow cruising speed which is approximately 21.7 km/hr (11.7 kts) which is generally below the speed at which studies have noted reported increases of marine mammal injury or death (Laist, Knowlton, Mead, Collet, & Podesta, 2001).

Estimated Take of Marine Mammals by Level B Incidental Harassment: The Observatory has requested take by Level B harassment as a result of their proposed marine seismic survey. Acoustic stimuli (*i.e.*, increased underwater sound) generated during the operation of the seismic airgun array are expected to result in the behavioral disturbance of marine mammals.

As mentioned previously, we estimate that 28 species of marine mammals under our jurisdiction could be potentially affected by Level B harassment over the course of the proposed authorization. For each species, these take numbers are small (most estimates are less than or equal to two percent) relative to the regional or overall population size. Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (*i.e.*, 24 hour cycle). Behavioral reactions to noise exposure (such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall et al., 2007). While we anticipate that the seismic operations would occur on consecutive days, the estimated duration of the survey would last no more than 20 days. Additionally, the seismic survey would be increasing sound levels in the marine environment in a relatively small area surrounding the vessel (compared to the range of the animals), which is constantly travelling over distances, and some animals may only be exposed to and harassed by sound for shorter less than day.

Table 3 outlines the number of requested Level B harassment takes and the regional population estimates for the marine mammal species that may be taken by Level B harassment that we anticipate as a result of these activities.

Table 3. Estimates of the possible numbers of marine mammals exposed to sound levels greater than or equal to 160 dB re: 1 μPa during the proposed seismic survey over the Mid-Atlantic Ridge in the north Atlantic Ocean, during April through June, 2013.

Species	Estimated Number of Individuals Exposed to Sound Levels ≥ 160 dB re: 1 μPa[1]	Requested or Adjusted Take Authorization[2]	Regional Population[3]	Approx. Percent of Regional Population[3]
Mysticetes				
North Atlantic right whale	0	0	0	0
Humpback whale	0	50	0	0
Minke whale	0	3[4]	0	0
Bryde's whale	1	1	Not available	Not available
Sei whale	1	9	13,000	0.01
Fin whale	25	198	24,887	0.10
Blue whale	8	66	937	0.89
Odontocetes				
Sperm whale	21	164	13,190	0.16
Pygmy sperm whale	0	0	395	0
Dwarf sperm whale	0	0	395	0
Cuvier's beaked whale	0	7[4]	3,513	0.2
Mesoplodon spp.				
True's beaked whale				
Gervais beaked whale	39	39		1.12
Sowerby's beaked whale				
Blainville's beaked whale			3,502	
Northern bottlenose whale	0	4[4]	~40,000	0
Rough-toothed dolphin	0	0	Not available	0
Common bottlenose dolphin	47	47	81,588	0.06
Pantropical spotted dolphin	0	0	4,439	0
Atlantic spotted dolphin	112	112	50,978	0.22
Striped dolphin	1,034	1,034	94,462	1.09
Short-beaked common dolphin	2,115	2,115	120,741	1.75
Risso's dolphin	21	21	20,479	0.10
Pygmy killer whale	0	0	Not available	0
False killer whale	7	7	Not available	Not available
Killer whale	0	5[4]	Not available	0
Long-finned pilot whale	0	0	780,000	0
Short-finned pilot whale	674	674	780,000	0.09

N/A = Not Available
[1] Estimates are based on densities in Table 2 and an ensonified area of (5,571 km^2; (2,151 mi^2)
[2] Requested or adjusted take includes a 25 percent contingency for repeated exposures due to the overlap of parallel survey tracks or adjusted take for listed species based on Section 7 consultation with NMFS.
[3] Regional population size estimates are from Table 2.
[4] Requested take authorization increased to group size for species for which densities were not calculated but for which there were OBIS sightings around the Azores.

We do not expect the activity to impact rates of recruitment or survival for any affected species or stock. Further, the seismic surveys would not take place in areas of significance for marine mammal feeding, resting, breeding, or calving and would not adversely impact marine mammal habitat.

4.2 EFFECTS OF ALTERNATIVE 2– NO ACTION ALTERNATIVE

Under the No Action Alternative, we would not issue an Incidental Harassment Authorization to the Observatory for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of a seismic survey in international waters in the northwest Atlantic Ocean, April through June, 2013. As a result, the Observatory would not receive an exemption from the MMPA and ESA prohibitions against take.

The impacts to elements of the human environment resulting from the No Action alternative, conducting the survey in the absence of species protective measures required by the Authorization under the MMPA and the Incidental Take Statement under the ESA would be similar to those resulting from the preferred alternative.

4.2.2 IMPACTS TO MARINE MAMMALS

Under the No Action alternative, the cruise would likely result in additional impacts to marine mammals —specifically related to acoustic activities—compared to the Proposed Action, due to the absence of mitigation and monitoring measures required under the Authorization.

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

- Marine mammals that could be encountered within the survey area could experience acoustic injury, temporary behavioral responses (such as brief masking of natural sounds), and temporary changes in animal distribution because of the lack mitigation measures required in the Authorization and Incidental Take Statement;
- Incidental take of marine mammals would likely occur at levels we have already identified and evaluated in our *Federal Register* notice on the proposed Authorization (78 FR 10137, February 13, 2013); and
- We would not be able to obtain the monitoring and reporting data needed to assess the anticipated impact of the activity upon the species or stock; the anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses; and increased knowledge of the species as required under the MMPA.

4.3 COMPLIANCE WITH NECESSARY LAWS – NECESSARY FEDERAL PERMITS

We have determined that the issuance of an Incidental Harassment Authorization is consistent with the applicable requirements of the MMPA, ESA, and our regulations.

Under section 7 of the ESA, the Foundation initiated formal consultation with the NMFS, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this seismic survey. Likewise, we have also conducted a concurrent formal consultation with the Office of Protected Resources, Endangered Species Act Interagency Cooperation Division.

The formal consultation under section 7 of the ESA concluded with a single Biological Opinion for the National Science Foundation's Division of Ocean Sciences and to the National Marine Fisheries Service's Office of Protected Resources, Permits and Conservation Division. All parties must comply with the relevant terms and conditions of the Incidental Take Statement corresponding to the Biological Opinion issued to the Foundation, the Observatory, and to us. The Observatory must comply with the mitigation and monitoring requirements included in the Authorization in order to be exempted from prohibition on take of listed endangered marine mammal species otherwise prohibited by section 9 of the ESA.

4.4 UNAVOIDABLE ADVERSE IMPACTS

The Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013* (LGL, 2013), their 2011 *Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey* (NSF, 2011), and our *Federal Register* notice requesting comments on the proposed Authorization (78 FR 10137, February 13, 2013) summarize unavoidable adverse impacts to marine mammals or the populations to which they belong or on their habitats occurring in the survey area. We incorporate those documents by reference.

We acknowledge that the incidental take authorized by the Authorization would potentially result in unavoidable adverse impacts. However, we do not expect the Observatory's activities to have adverse consequences on the viability of marine mammals in the study area and 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. Numbers of individuals of all species taken by harassment are expected to be small (relative to species or stock abundance), and the seismic survey would have a negligible impact on the affected species or stocks of marine mammals.

4.5 CUMULATIVE EFFECTS

Cumulative effects are defined 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.

Impacts to marine mammal populations include the following: commercial whaling; altered prey base and habitat quality as a result of global warming; ship strikes; fishing gear entanglement; exposure to biotoxins and the resulting bioburden; vessel noise; competition with commercial fisheries; and killer whale predation. These activities account for cumulative impacts to regional and

worldwide populations of marine mammals, many of whom are a small fraction of their former abundance and are listed as endangered or threatened under the ESA and depleted under the MMPA.

Marine mammal experts now consider acoustic masking from anthropogenic noise as the major threat to marine mammal populations, particularly low-frequency specialists such as baleen whales. Low-frequency ocean noise has increased in recent decades, often in habitats with seasonally resident populations of marine mammals, raising concerns that noise chronically influences life histories of individuals and populations (Clark et al., 2009). However, quantifying the biological costs for marine mammals within an ecological framework is a critical missing link to our assessment of cumulative noise impacts in the marine environment and assessing cumulative effects on marine mammals (Clark, et al., 2009).

Despite these regional and global anthropogenic and natural pressures, available trend information indicates that most local populations of marine mammals in the Atlantic Ocean are stable or increasing (Waring, et al., 2013). The proposed seismic survey would add another, albeit temporary activity to the marine environment in the Atlantic Ocean and the proposed survey would be limited to a small area on the Mid-Atlantic Ridge for a relatively short period of time.

The Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013* (LGL, 2013) summarizes the potential cumulative effects to marine mammals or the populations to which they belong or on their habitats occurring in the survey area. Their analyses which incorporate their analyses by reference and briefly summarize them here focuses on activities that could impact animals specifically in the proposed survey area (*i.e*., research activities, vessel traffic, and commercial fisheries).

4.5.1 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE SEISMIC SURVEYS ON THE MID-ATLANTIC RIDGE

L-DEO conducted a marine seismic survey between 31 October and 5 November 2003 on the Mid-Atlantic Ridge at approximately 26º N, 45º W. As part of the Integrated Ocean Drilling Program (IODP), the drilling vessel JOIDES Resolution has conducted scientific research at several drill sites on the Mid-Atlantic Ridge at approximately 30° N on three expeditions, during 2004, 2005, and 2012. Other scientific research activities have been and may be conducted in this region in the future, however no other marine geophysical surveys are proposed using the *Langseth* in the foreseeable future.

At the present time, the action proponents are not aware of other research activities planned to occur in the proposed survey area during the April–May 2013 timeframe, but research activities planned by other entities are possible.

There are no other seismic surveys with an Authorization from us scheduled to occur offshore the Azores in international waters in the Atlantic Ocean, April through June, 2013. 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

4.5.2 VESSEL TRAFFIC AND VESSEL NOISE

No major ports are located near the proposed survey area except for those in the Azores greater than 400 km to the northeast. Some trans-Atlantic shipping lanes do pass near the survey area. Vessel traffic would consist mainly of commercial vessels and possibly commercial fishing vessels. Based on the data available through the Automated Mutual-Assistance Vessel Rescue (AMVER) system managed by the U.S. Coast Guard, 5 to 14 commercial vessels per month travelled through the majority of proposed survey area during the month of June from 2007 to 2012, and for each month in 2011 and 2012 (LGL, 2013).

The total transit distance by the *Langseth* (a maximum of approximately 8,000 km) would be minimal relative to total transit length for vessels operating in the proposed survey area during April and May. We expect that the impacts of the of the *Langseth's* operations combined with the existing shipping operations to produce an insignificant overall ship disturbance effects on marine mammals. .

4.5.3 FISHING

The Foundation's 2013 *Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the mid-Atlantic Ridge, April–May 2013* (LGL, 2013) describes commercial fisheries operations in the general area of the proposed survey (Chapter 3). The primary contributions of fishing to potential cumulative impacts on marine mammals involve direct removal of prey items, noise, potential entanglement and the direct and indirect removal of prey items. There may be some localized avoidance by marine mammals of fishing vessels near the proposed seismic survey area. Fishing operations in the proposed survey area likely would be limited because of the deep water and distance from land. The Observatory's operations in the proposed survey area are also limited temporally (duration of 20 days), and we expect that the combination of the *Langseth's* operations with the existing commercial fishing operations to produce an insignificant overall disturbance effect on marine mammals.

CHAPTER 5 – LIST OF PREPARERS AND AGENCIES CONSULTED

Agencies Consulted:

Endangered Species Act Interagency Cooperation Division
Office of Protected Resources
NOAA, National Marine Fisheries Service
1315 East-West Hwy, Suite 13758
Silver Spring, MD 20910

Prepared By:

Jeannine Cody, M. Sci.
Fisheries Biologist
Permits and Conservation Division
Office of Protected Resources
NOAA, National Marine Fisheries Service

CHAPTER 6 – REFERENCES

Clark, C. W., Ellison, W. T., Southall, B. L., Hatch, L., Van Parijs, S. M., Frankel, A., et al. (2009). Acoustic masking in marine ecosystems: intuitions, analysis, and implication. *Marine Ecology Progress Series, 395*, 201-222.

Greene, C. R., Jr. (1997). *Physical acoustics measurements. p. 3-1 to 3-63 in W.J. Richardson (ed.) Northstar Marine Mammal Monitoring Program, 1996: Marine mammal and acoustical monitoring of a seismic program in the Alaskan Beaufort Sea. LGL Rep. 2121-2.* LGL Ltd., King City, Ont., and Greeneridge Sciences Inc., Santa Barbara, CA: LGL Limited, Environmental Research Associates.

Laist, D. W., Knowlton, A. R., Mead, J. G., Collet, A. S., & Podesta, M. (2001). Collisions between ships and whales. *Marine Mammal Science, 17*(1), 35-75.

LGL. (2003). (LGL Ltd., environmental research associates). Environmental Assessment of Lamont-Doherty Earth Observatory's Marine Seismic Surveys in the Mid-Atlantic Ocean. LGL Report TA2822-9 Rep. from LGL Ltd., King City, Ont., for Lamont-Doherty Earth Observatory of Columbia Univ., Palisades, NY, and National Science Foundation, Arlington, VA., 104 pp.

LGL. (2013). (LGL Ltd., environmental research associates). Draft Environmental Analysis of a Marine Geophysical Survey by the R/V Marcus G. Langseth on the Mid-Atlantic Ridge, April–May 2013. LGL Report TA8220-1. Rep. from LGL Ltd., King City, Ont., for Lamont-Doherty Earth Observatory of Columbia Univ., Palisades, NY, and National Science Foundation, Arlington, VA., 42 pp.

Magalhães, S., Prieto, R., Silva, M. A., Gonçalves, J., Afonso-Dias, M., & Santos, R. S. (2002). Short-term reactions of sperm whales (Physeter macrocephalus) to whale-watching vessels in the Azores. *Aquatic Mammals, 28*(3), 267-274.

NMFS. (2013). (National Marine Fisheries Service). Takes of Marine Mammals Incidental to Specified Activities; Marine Geophysical Survey on the Mid-Atlantic Ridge in the Atlantic Ocean, April 2013, Through June 2013. Notice; proposed incidental harassment authorization; request for comments. ***Fed. Regist.*** *78(30, 13 Feb.):10137-10160*.

NSF. (2011). (National Science Foundation). 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. 801 pp.

Waring, G., Josephson, E., Fairfield-Walsh, C., Maze-Foley, K., & Rosel, P. (2013). U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2012 *Volume 1*, 425 pp.