



FEB - 3 2014

To All Interested Government Agencies and Public Groups:

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

- TITLE:** *Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*
- LOCATION:** Southern Ocean in International Waters in the Dumont d'Urville Sea off the coast of East Antarctica (from greater than approximately 64° South and between 95 to 135° East, from greater than approximately 65° South and between approximately 140 to 165° East)
- SUMMARY:** The National Marine Fisheries Service (NMFS) proposes to issue an Incidental Harassment Authorization (IHA) for the take, by Level B harassment only, of marine mammals during a low-energy marine geophysical (i.e., seismic) survey in the Dumont d'Urville Sea off the coast of East Antarctica, January to March 2014. NMFS has prepared an Environmental Assessment (EA) titled *Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*, and prepared an independent Finding of No Significant Impact (FONSI). In the EA, NMFS incorporated by reference the National Science Foundation (NSF) and Antarctic Support Contract's *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics*. NMFS has determined that the impact of conducting the low-energy marine seismic survey in International Waters in the Dumont d'Urville Sea off the coast of East Antarctica in the Southern Ocean, may result, at worst, in a temporary modification in behavior of small numbers of species or stocks of marine mammals. No injury, serious injury, or mortality is anticipated to result from this activity, nor is it authorized. NMFS has further determined that this activity will result in a negligible impact on the affected species or stocks.



RESPONSIBLE OFFICIAL: Donna S. Wieting
Director
Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway, Room 13821
Silver Spring, MD 20910
301-427-8400

The environmental review process including the analysis and determinations made during the IHA application and issuance process has led us to conclude that this action will not have a significant effect on the human environment. Therefore, an Environmental Impact Statement will not be prepared. A copy of the FONSI prepared by the NMFS, the supporting EA, and NSF document incorporated by NMFS, are enclosed for your information.

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

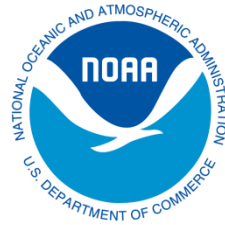
Please submit any written comments to the responsible official named above.

Sincerely,



Patricia A. Montanio
NOAA NEPA Coordinator

Enclosure



NOAA FISHERIES

PROPOSED ACTION: Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014.

TYPE OF STATEMENT: Environmental Assessment

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

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

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

LOCATION: Selected regions of the Dumont d'Urville Sea in International Waters of the Southern Ocean off the coast of East Antarctica (Approximately 64° South, between 95 and 135° East, and 65° South, between 140 to 165° East)

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 the National Science Foundation and Antarctic Support Contract for the taking, by Level B harassment, of small numbers of marine mammals, incidental to conducting a low-energy marine geophysical survey in the Dumont d'Urville Sea, January to March 2014.

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LIST OF ABBREVIATIONS OR ACRONYMS

AEP	auditory evoked potential
ASC	Antarctic Support Contract
BiOp	Biological Opinion
CFR	Code of Federal Regulations
Commission	Marine Mammal Commission
dB	decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973 (16 U.S.C. 1531 <i>et seq.</i>)
FONSI	Finding of No Significant Impact
FR	<i>Federal Register</i>
ft	feet
IEE/EA	Initial Environmental Evaluation/Environmental Assessment
IHA	Incidental Harassment Authorization
ITA	Incidental Take Authorization
ITS	Incidental Take Statement
km	kilometer
km/hr	kilometer per hour
kts	knots
m	meter
mi	mile
mph	miles per hour
MMPA	Mammal Protection Act of 1972, as amended (16 U.S.C. 1631 <i>et seq.</i>)
μPa	microPascal
nmi	nautical miles
<i>Palmer</i>	<i>RVIB Nathaniel B. Palmer</i>
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 (CEQ) 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 (IHA) to the National Science Foundation (NSF) and Antarctic Support Contract (ASC), 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 low-energy marine geophysical (seismic) survey on the high seas (i.e., international waters) in the Dumont d'Urville Sea off the coast of East Antarctica in the Southern Ocean, January through March 2014. We do not have the authority to permit, authorize, or prohibit NSF and ASC's low-energy seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica.

Our proposed action results from NSF and ASC's request for an authorization to take marine mammals, by harassment, incidental to conducting a low-energy marine seismic survey in the Dumont d'Urville Sea. NSF and ASC's low-energy 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, *Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*, focuses primarily on the environmental effects of authorizing the take of marine mammals incidental to NSF and ASC's activities.

To evaluate the effects of conducting the low-energy marine geophysical (seismic) survey in the Dumont d'Urville Sea during a period between January and March 2014, the NSF and ASC has prepared an *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 2013) (available at:

http://www.nmfs.noaa.gov/pr/pdfs/permits/nsf_totten_ieeea_revised.pdf). We do not duplicate their analysis; rather we incorporate it by reference as explained further in this document. NSF'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/USGS PEIS) (NSF, 2011) (available at: http://www.nsf.gov/geo/oce/envcomp/usgs-nsf-marine-seismic-research/nsf-usgs-final-eis-oeis_3june2011.pdf) which considers all impacts of conducting a low-energy seismic survey. We incorporate the 2011 NMFS/USGS PEIS by reference. Last, we published a notice for the proposed IHA in the *Federal Register* (79 FR 464, January 3, 2014; [NMFS, 2014]) (available at:

<http://www.gpo.gov/fdsys/pkg/FR-2014-01-03/pdf/2013-31471.pdf>) which provided a detailed description of the proposed low-energy seismic survey and environmental information and issues related to it. On January 7, 2014, NMFS published a notice in the *Federal Register* (79 FR 816) correcting the close of the public comment period from February 3, 2014 to January 30, 2014 (available at: <http://www.gpo.gov/fdsys/pkg/FR-2014-01-07/pdf/C1-2013-31471.pdf>). We also incorporate these notices by reference.

We have prepared this EA to assist in determining whether the direct, indirect, and cumulative impacts related to our issuance of an IHA under the MMPA for marine mammals for NSF and ASC's survey is likely to result in significant impacts to the human environment. This EA is intended to inform our decision on issuing the IHA. While the focus of this EA is on the effects caused by the proposed issuance of an IHA, 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 low-energy seismic survey. We anticipate the issuance of an IHA to take small numbers of marine mammals incidental to NSF and ASC'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 IHA 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 IHA in the *Federal Register* (79 FR 464, January 3, 2014) 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 IHA includes prescribed means of incidental take, mitigation and monitoring measures, and reporting requirements.

For the No Action Alternative, we would not issue an IHA to NSF and ASC for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the low-energy seismic survey.

- The No Action Alternative also includes the full suite of activities conducted by NSF and ASC for the low-energy seismic survey. Because we do not have the authority to permit, authorize, or prohibit the seismic surveys themselves, NSF and ASC 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 have focused on the potential environmental effects that could arise without the mitigation and monitoring measures for marine mammals prescribed in the IHA for incidental take in order to sharply compare and contrast alternatives.

ES.4 Environmental Impacts of the Proposed Action

NSF and ASC's proposed low-energy 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 potential adverse interactions with marine mammals and their habitat. We acknowledge that the incidental take authorized by the IHA would potentially result in insignificant, unavoidable adverse impacts. However, we believe that the issuance of an IHA would not result in significant 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 IHA to NSF and ASC for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of the low-energy marine seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica, January to March 2014 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 (NMFS, Office of Protected Resources, Permits and Conservation Division) propose to issue an IHA to NSF and ASC under the MMPA for the taking of small numbers of marine mammals, incidental to the conduct of a low-energy marine geophysical (seismic) survey in international waters in the Dumont d'Urville Sea, January through March 2014. We do not have the authority to authorize or prohibit NSF and ASC's low-energy seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica.

Our proposed action is triggered by NSF and ASC's request for an IHA to take marine mammals incidental to conducting the proposed low-energy marine seismic survey within international waters in the Dumont d'Urville Sea. NSF and ASC'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. NSF and ASC therefore requires an IHA for incidental take and have requested that we provide it through the issuance of an IHA under section 101(a)(5)(D) of the MMPA. Our issuance of an IHA to NSF and ASC 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, *Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and the Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*, addresses the potential environmental impacts of two choices available under section 101(a)(5)(D) of the MMPA, namely:

- Issue the IHA to NSF and ASC for Level B harassment take of marine mammals under the MMPA during the low-energy seismic survey, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the IHA; or
- Not issue an IHA to NSF and ASC 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 IHA.

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.

1.1.1 BACKGROUND ON THE APPLICANT'S MMPA APPLICATION

NSF and ASC propose to use the RVIB *Nathaniel B. Palmer (Palmer)*, a 94 meter (m) (308.5 feet [ft]) research vessel owned by Edison Chouest Offshore, Inc. and operated by NSF and ASC (under a long-term charter with Edison Chouest Offshore, Inc.), to use conventional seismic methodology to perform marine-based studies in the Dumont d'Urville Sea to include evaluation of geophysical and physical oceanographic features in two areas along the coast of East Antarctica (in support of the United States Antarctic Program). The primary area proposed for the study is the Totten Glacier system (preferred study area) including the Moscow University Ice Shelf along the Sabrina Coast, and a secondary area, the Mertz Glacier and Cook Ice Shelf, along the Oates Coast.

The NSF 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 NSF considers proposals submitted by organizations and makes contracts and/or other arrangements (i.e., grants, loans, and other forms of assistance) to support research activities. In 2013, a NSF-expert panel recommended a collaborative research proposal titled, *Totten Glacier System and the Marine Record of Cryosphere – Ocean Dynamics* (Award Leventer #111143836, Domack #1143837, Huber #1143834, Orsi #1143833, and Blankenship/Gulick #1143843) for funding and ship time on the *Palmer*. As the Federal action agency, the NSF has funded ASC, Colgate University, University of Texas at Austin, University of South Florida, Columbia University, and Texas A&M Research Foundation's proposed low-energy seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica, January through March 2014 as a part of the NSF Act of 1950. We describe the NSF-supported low-energy seismic survey in more detail in Section 2.2.

1.1.2 MARINE MAMMALS IN THE ACTION AREA

On July 3, 2013, we received an application from NSF and ASC, which reflected updates to the mitigation zones (for safety), 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 low-energy seismic survey include:

Mysticetes

- Blue whale (*Balaenoptera musculus*)
- Fin whale (*B. physalus*)
- Humpback whale (*Megaptera novaeangliae*)
- Sei whale (*B. borealis*)
- Antarctic minke whale (*B. bonaerensis*)
- Southern right whale (*Eubalaena australis*)

- Spectacled porpoise (*Phocoena dioptrica*)

Odontocetes

- Arnoux's beaked whale (*Berardius arnuxii*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Hourglass dolphin (*Lagenorhynchus cruciger*)
- Killer whale (*Orcinus orca*)
- Long-finned pilot whale (*Globicephala melas*)
- Sperm whale (*Physeter macrocephalus*)
- Southern bottlenose whale (*Hyperoodon planifrons*)

Pinnipeds

- Crabeater seal (*Lobodon carcinophaga*)
- Leopard seal (*Hydrurga leptonyx*)
- Ross seal (*Ommatophoca rossii*)
- Weddell seal (*Leptonychotes weddellii*)
- Southern elephant seal (*Mirounga leonina*)
- Antarctic fur seal (*Arctocephalus gazella*)

1.2 BACKGROUND FOR 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 IHA 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 IHA 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 IHA.

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 (BiOp). The BiOp includes, among other things, an Incidental Take Statement (ITS) which must specify measures the Secretary considers necessary or appropriate to minimize the impact of such take. 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 IHA 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 IHA to NSF and ASC is to authorize (pursuant to the MMPA) the NSF and ASC’s request to take marine mammals incidental to NSF and ASC’s proposed activities. The IHA, if issued, would exempt the NSF and ASC from the take prohibitions contained in the MMPA. 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 IHA 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 adverse 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 the means of effecting the least practicable adverse impact on the availability of the species or stocks of marine mammals for subsistence uses. IHAs 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 IHA must be published in the *Federal Register* for public notice and comment.

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 IHA for the incidental take of small numbers of marine mammals.

On July 3, 2013, NSF and ASC submitted an application demonstrating both the need and potential eligibility for issuance of an IHA in connection with the seismic cruise described in Section 1.1.1. NMFS needs to review the IHA application to determine if the action proposed is consistent with applicable statutes and regulations. We now have a corresponding duty to determine whether and how we can fashion an IHA authorizing take by Level B harassment incidental to the activities described in NSF and ASC'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 alternatives of developing and issuing an IHA, 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 IHA 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 IHA 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 federal action subject to NEPA.

We prepared this EA to determine whether the direct, indirect and cumulative impacts related to its issuance of the IHA for incidental take of marine mammals under the MMPA during the low-energy seismic surveys in international waters in the Dumont d'Urville Sea off the coast of East Antarctica 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 IHA.

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 IHA 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 NSF and ASC's 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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/USGS, 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 IHA (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 IHA in the *Federal Register* (FR) within 45 days.

The regulations published by the Council on 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 IHAs 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 January 3, 2014, we published a notice of a proposed IHA with our preliminary determinations in the *Federal Register* (79 FR 464). On January 7, 2014, NMFS published a notice in the *Federal Register* (79 FR 816) correcting the close of the public comment period from February 3, 2014 to January 30, 2014. 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 IHA; 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 IHA and issues for consideration in this EA.

This EA titled, *Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Maine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*, incorporates by reference and relies on the NSF and ASC's July 2013 application, our notice of a proposed IHA (79 FR

464, January 3, 2014), and their environmental analyses by reference to avoid duplication of analysis and unnecessary length.

Our notice of a proposed IHA (79 FR 464, January 3, 2014) 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 IHA to NSF and ASC to incidentally harass by Level B harassment only, 14 species of marine mammals during the proposed 45-operational day low-energy seismic survey. Within the notice of the proposed IHA (79 FR 464, January 3, 2014) we considered the applicant's proposed action and their proposed mitigation and monitoring measures that would effect the least practicable adverse impact on marine mammals including: (1) vessel-based visual mitigation monitoring; (2) proposed exclusion zones; (3) shut-down procedures; (4) ramp-up procedures; and (5) speed and course alterations. We preliminarily determined, based on implementation of the required mitigation and monitoring measures, that the impact of conducting a proposed survey in the International Waters of the Dumont d'Urville Sea off the coast of East Antarctica, from January through March 2014, would result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals, both of which would be insignificant.

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

The NSF and ASC, which funds (i.e., NSF) and operates (i.e., ASC) the project and research vessel that would serve as the operational platform for the seismic survey, directed AECOM to prepare an environmental analysis titled, *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 2013) to meet their requirements under Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, for NSF and ASC's proposed federal action. The NSF and ASC'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.

After conducting an independent review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on NSF and ASC'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 NSF and ASC's 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics*, prepared by AECOM (AECOM, 2013); and
- The NSF'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 NSF and ASC's 2013 environmental analysis (AECOM, 2013) contains a description of NSF and ASC's proposed low-energy seismic survey, proposed mitigation measures, and issuance of an IHA (Section II); and a discussion of the affected environment and environmental

consequences (Section IV) (AECOM, 2013). The NSF/USGS's 2011 PEIS (NSF, 2011) also considers, in a qualitative way (Section 2.3.1.2), the affected environment and environmental consequences of conducting a low-energy seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica 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 NSF and ASC's analyses conclude that with incorporation of monitoring and mitigation measures proposed by NSF and ASC, the potential impacts of the proposed action to marine mammals 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 NSF and ASC 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 IHA which includes prescribed means of take, mitigation measures and monitoring requirements) this EA (relying on the environmental review and analyses performed by the NSF, the application and the notice of proposed IHA 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 IHA authorizing the take of marine mammals incidental NSF and ASC'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 because these other elements will not be effected by our action.

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

Biological	Physical	Socioeconomic / Cultural
Non-listed Fish	Water Quality	Commercial Fishing
Non-listed Invertebrates	Essential Fish Habitat	Military Activities
Non-listed Sea Turtles	Geography	Oil and Gas Activities
	Oceanography	Recreational Fishing
	State Marine Protected Areas	Shipping and Boating
	Federal Marine Protected Areas	National Historic Preservation Sites
	National Estuarine Research Reserves	Low Income Populations
	National Marine Sanctuaries	Minority Populations
	Ecologically Critical Areas	Indigenous Cultural Resources
		Public Health and Safety
		Historic and Cultural Resources

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 IHA application and in the *Federal Register* notice of the proposed IHA (79 FR 464, January 3, 2014). 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 IHA.

The *Federal Register* notice of the proposed IHA with our preliminary determinations (79 FR 464, January 3, 2014), 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 IHA (79 FR 464, January 3, 2014) 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 IHA was available for public review and comment from January 3 to January 30, 2014.

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 NSF'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 IHA (79 FR 464, January 3, 2014). This EA does not expand the scope of environmental issues and impacts for consideration and is based primarily on the information included in our *Federal Register* notice (79 FR 464, January 3, 2014), the documents it references, and the public comments provided in response. At the conclusion of this process, we will post the final EA, and, if appropriate, the FONSI, on the same website.

1.3.4 RELEVANT COMMENTS ON THE NSF AND ASC'S ANALYSIS

NSF and ASC in terms of public review and comment, have followed the system established under the Antarctic Conservation Act. Specifically, per 45 CFR 641.17c and Appendix 1, Article 6 of the Madrid Protocol under the Antarctic Treaty, the Environmental Office, Division of Polar Programs, shall make the list and copies of final IEEs available to the public upon request. An annual list of IEEs and a description of any decisions taken in consequence thereof shall be circulated to all Antarctic Treaty Parties in April, annually, as required using the Electronic Information Exchange System (<http://www.ats.aq/e/ie.htm>). The NSF and ASC IEE/EA will therefore be submitted to the Treaty Parties this coming April. NMFS posted the NSF and ASC'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 IHA (79 FR 464, January 3, 2014). 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 IHA, should we determine to issue the IHA.

1.3.5 RELEVANT COMMENTS ON OUR *FEDERAL REGISTER* NOTICE

During the 30-day public comment period on the notice of the proposed IHA (79 FR 464, January 3, 2014) we received comments from one individual and the Marine Mammal Commission (Commission). Public comments on the notice of the proposed IHA postmarked by January 30, 2014 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 NSF and ASC's action include:

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

On January 30, 2014, we received comments from the Commission on the notice of the proposed IHA (79 FR 464, January 3, 2014). The Commission provides comments on all proposed ITAs 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 NSF and ASC to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific parameters (including at least sound speed profiles, bathymetry, and sediment characteristics) for the proposed IHA – NMFS should make the same requirement for all future IHAs submitted by NSF, ASC,

Lamont-Doherty Earth Observatory (L-DEO), U.S. Geological Survey (USGS), Scripps Institution of Oceanography (SIO), or any other related entity.

- (1) Require NSF and ASC to revise its take estimates to include Level B harassment takes associated with the use of the single-beam and multi-beam echosounder when the airgun is not firing, and (2) follow a consistent approach of requiring the assessment of Level B harassment takes for those types of sound sources (e.g., sub-bottom profilers, echosounders, side-scan sonar, and fish-finding sonar) by all applicants, who propose to use such sources.
- Require NSF and ASC to estimate the numbers of marine mammals taken when the single-beam and multi-beam echosounder are used in the absence of the airgun array based on the 120 dB re 1 μ Pa threshold rather than the 160 dB re 1 μ Pa threshold.
- Consult with experts in the field of sound propagation and marine mammal hearing to revise the Level B harassment thresholds for behavior to specify threshold levels that would be more appropriate for a wider range of sound sources, including shallow penetration sub-bottom profilers, echosounders, and side-scan sonar – if NMFS plans to propose behavior thresholds for seismic surveys separate from other activities, include thresholds for all types of sources that are used, not just for airguns.
- Consult with the funding agency (i.e., NSF) and individual applicants (e.g., L-DEO, SIO, and USGS) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal takes and the actual numbers of marine mammals taken – the assessment should account for applicable $g(0)$ and $f(0)$ values.
- (1) Provide a full 30-day public review and comment period that starts with the publication of notices in the printed edition of the *Federal Register* and (2) allow sufficient time after the close of the comment period and prior to issuance of an IHA to allow the agency to analyze, consider, respond to, and make any necessary changes to the proposed IHA or NMFS's rationale based on those comments.

We have considered the comments regarding monitoring and mitigation measures within the context of the MMPA requirement to effect the least practicable adverse 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 IHA; 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 IHA and this EA.

Based on those comments, we have re-evaluated the mitigation and monitoring proposed for incorporation in the IHA 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 NMFS.

The NSF and ASC have 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, sei, humpback, and sperm whales. Under section 7 of the ESA, the NSF, the lead Federal agency which funds the *Palmer*, has engaged in a formal consultation with the NMFS, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this proposed low-energy seismic survey.

Likewise, our issuance of an IHA 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 IHA to NSF and ASC 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, sei, humpback, and sperm whales, we have also engaged in a 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 NSF's Division of Polar Programs and to the NMFS's Office of Protected Resources, Permits and Conservation Division for the seismic cruise and associated IHA.

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

The requirements for Executive Order (E.O.) 12114 are discussed in the NSF and ASC's 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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 NSF prepares environmental analyses for major Federal actions which could have environmental impacts anywhere beyond the territorial jurisdiction of the United States. NOAA, as a matter of policy, prepares NEPA analyses for proposed major federal actions occurring within its territorial waters, the U.S. EEZ, the high seas, and the EEZs of foreign nations.

CHAPTER 2 – ALTERNATIVES 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 NSF and ASC'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 (NEPA; Section 1502.14(d)). 40 CFR Sec. 1508.23 states that if an agency subject to NEPA has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal, the effects can be meaningfully evaluated.

- 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 NSF AND ASC'S PROPOSED SEISMIC SURVEY

NSF and ASC plans to conduct a low-energy seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica in January to March 2014 (see Figures 1, 2, and 3). In addition to the low-energy seismic survey, scientific activities would include conducting a bathymetric profile survey of the seafloor using transducer based instruments such as a multi-beam echosounder, and sub-bottom profiler; conducting magnetometry and imaging surveys using an underwater camera assembly, collecting sediment cores and dredge sampling; and collecting water samples and conductivity (salinity), temperature, depth (CTD) and current data through the deployment and recovery of short-term (in place for approximately one month) and long-term (in place for approximately one year) instrumentation moorings, CTD equipment casts, and the use of transducer-based acoustic Doppler current profiler (ADCP) instruments. The research would be conducted by five research institutions: Colgate University, Columbia University, Texas A&M Research Foundation, University of South of Florida, and University of Texas at Austin. NSF and ASC plan to use one source vessel, the *Palmer*, and a seismic airgun array to collect seismic data in the Southern Ocean. The vessel would be operated by ASC, which operates the United States Antarctic Program under contract to the NSF. The NSF and ASC plans to use conventional low-energy, seismic methodology to perform marine-based studies in the Dumont d'Urville Sea to include evaluation of geophysical and physical oceanographic features in two areas along the coast of East Antarctica. In addition to the planned operations of the seismic airgun array and hydrophone streamer, NSF and ASC intends to operate a single-beam echosounder, multi-beam echosounder, ADCP, and sub-bottom profiler continuously throughout the survey.

The proposed survey of Totten Glacier and Moscow University Ice Shelf along the Sabrina Coast continental shelf is designed to address several critical questions. The Totten Glacier system, which drains one-eighth of the East Antarctic Ice Sheet and contains more ice volume than the entire West Antarctic Ice Sheet, remains the single largest and least understood glacial system which possesses a potentially unsteady dynamic. If it were to melt, sea-level would rise by more than 5 m (16.4 ft) worldwide. The proposed marine studies would help to understand both the dynamics and the controls of the Totten Glacier system, and to resolve ambiguity in large ice mass dynamic behavior. This research would be accomplished via the collection of glaciological, geological, and physical oceanographic data. In order to place the modern system, as well as more recent changes to the system, into a longer-term perspective, researchers would collect and interpret marine geologic, geochemical, and geophysical records of the longer term behavior and response of this system. The proposed research would complement fieldwork studying other Antarctic ice shelves oceanographic studies near the Antarctic Peninsula, and ongoing development of ice sheet and other ocean models. It would facilitate learning at sea and ashore by students, help to fill important spatial and temporal gaps in a sparsely sampled region of coastal Antarctica, and communicate its findings

via publications and outreach. Obtaining records of currents and oceanographic properties in this region are consistent with the objectives of the Southern Ocean Observing System for climate change. The work would enhance general understanding of air-sea-ice interactions, ocean circulation, ice shelf sensitivity to climate change, and the present and future roles of East Antarctic Ice Sheet on sea level.

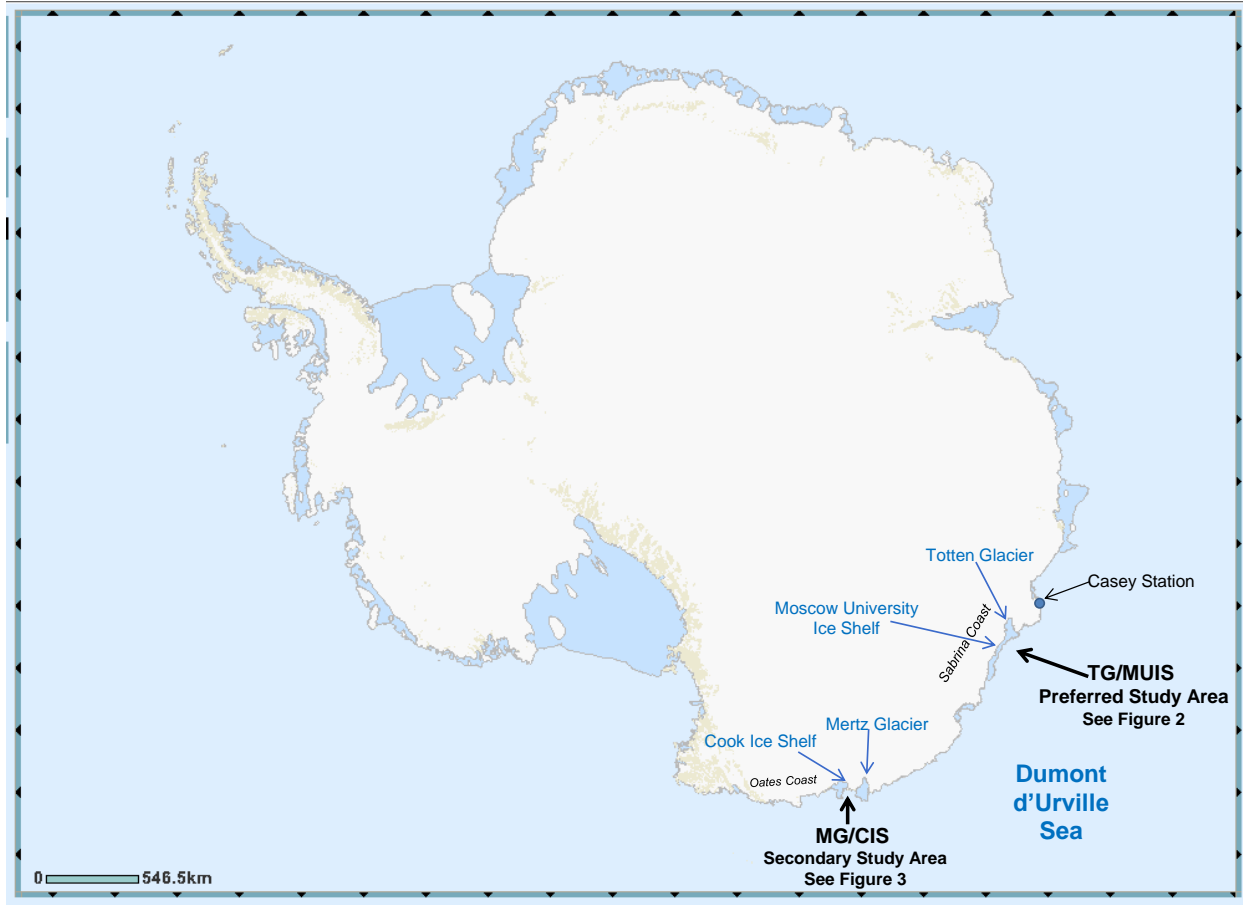


Figure 1. Locations of the proposed low-energy seismic survey, the Totten Glacier System and Mertz Glacier study areas, January through March 2014.

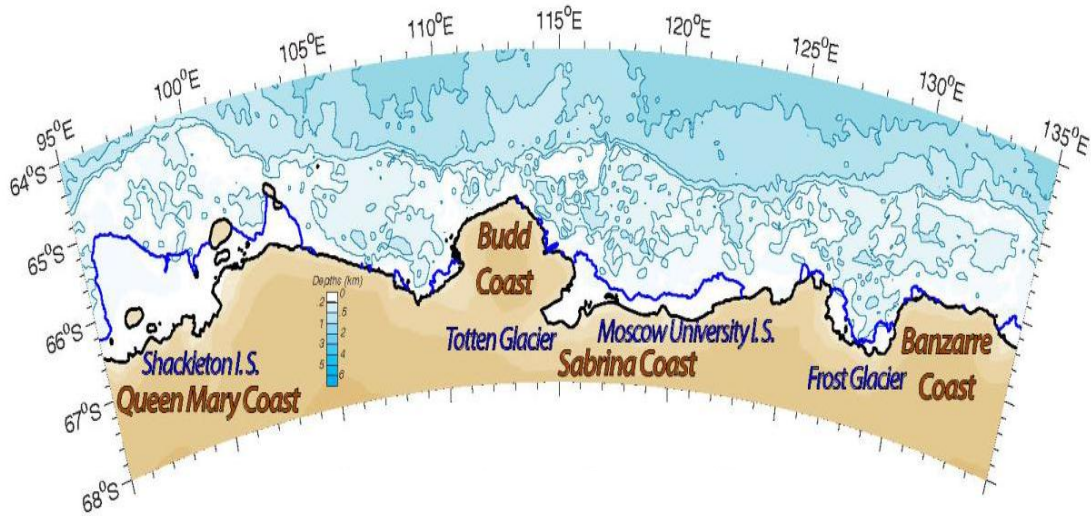


Figure 2. Totten Glacier System study area.

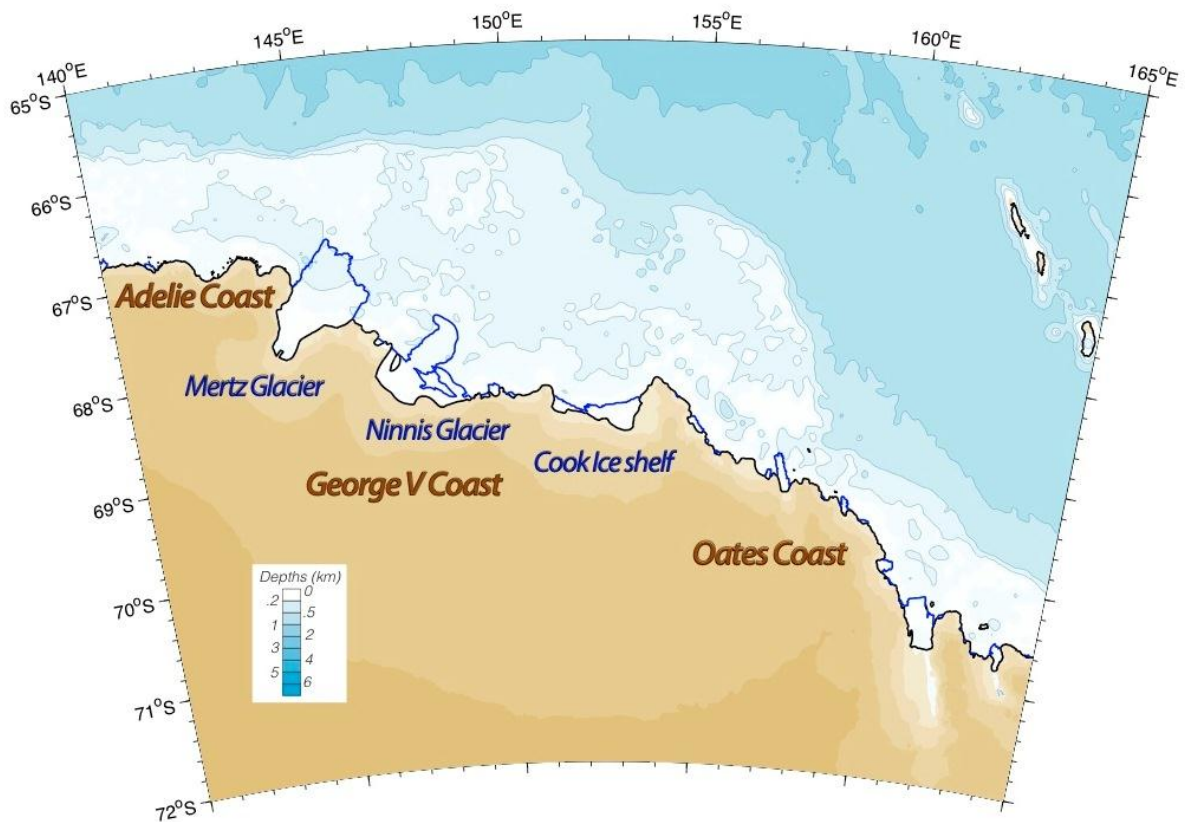


Figure 3. Mertz Glacier study area.

2.2.1 SPECIFIED TIME AND SPECIFIED AREA

The NSF and ASC's proposed project and survey sites are located in selected regions of the Dumont d'Urville Sea in the Southern Ocean off the coast of East Antarctica and focus on the

Totten Glacier and Moscow University Ice Shelf, located on the Sabrina Coast, from greater than approximately 64° South and between approximately 95 to 135° East (see Figure 2 of the IHA application), and the Mertz Glacier and Cook Ice Shelf systems located on the George V and Oates Coast, from greater than approximately 65° South and between approximately 140 to 165° East in International Waters. The planned study sites are characterized by heavy ice cover, with a seasonal break-up in the ice that structures biological patterns. The proposed studies would occur in both areas, or entirely in one or the other, depending on ice conditions. Figure 3 of the IHA application illustrates the limited detailed bathymetry of the two study areas. Ice conditions encountered during the previous surveys in the region limited the area where bathymetric data could be collected. Water depths in the survey area range from approximately 100 to 1,000 m, and possibly exceeding 1,000 m in some areas. There is limited information on the depths in the study area and therefore more detailed information on bathymetry is not available. Figures 2 and 3 of the IHA application illustrate the limited available detailed bathymetry of the two proposed study areas due to ice conditions encountered during previous surveys in the region. The planned seismic survey would be within an area of approximately 5,628 km² (1,640.9 nmi²). This estimate is based on the maximum number of kilometers for the seismic survey (2,800 km) times the predicted rms radii (m) based on modeling and empirical measurements (assuming 100% use of the two 105 in³ GI airguns in 100 to 1,000 m water depths) which was calculated to be 1,005 m (3,297.2 ft) (multiplied by two to calculate the diameter of the buffer zone).

The icebreaking will occur, as necessary, between approximately 66 to 70° South and between 140 to 165° East. The total distance in the region of the vessel will travel include the proposed seismic survey and transit to dredging or sampling locations and will represent approximately 5,600 km (3,023.8 nmi). Based on a maximum sea ice extent of 250 km (135 nmi) and estimating that NSF and ASC will transit to the innermost shelf and back into open water twice, a round trip transit in each of the potential work regions, NSF and ASC estimate that the *Palmer* will actively break ice up to a distance of 1,000 km (540 nmi). Based on a ship's speed of 5 kts under moderate ice conditions, this distance represents approximately 108 hrs of icebreaking operations.

The *Palmer* is expected to depart from Hobart, Tasmania on approximately January 29, 2014 and return to Hobart, Tasmania on approximately March 16, 2014. Research operations would be over a span of 45-days, including to and from port. Ice-free or very low concentrations of sea ice are required in order to collect high quality seismic data and not impede passage of the vessel between sampling locations. This requirement restricts the cruise to operating in mid to late austral summer when the ice concentrations are typically the lowest. Some minor deviation from this schedule is possible, depending on logistics and weather (i.e., the cruise may depart earlier or be extended due to poor weather; there could be additional days of seismic operations if collected data are deemed to be of substandard quality). Therefore, we propose to issue an IHA that is effective from January 31, 2013 to April 27, 2014.

2.2.2 SEISMIC ACQUISITION AND ACTIVE ACOUSTIC OPERATIONS

The NSF and ASC's analysis titled, *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics*, (AECOM, 2013); NSF and ASC's application; and our notice of the proposed IHA (79 FR 464, January 3, 2014) describe the survey protocols in detail. We incorporate those descriptions by reference in this EA and briefly summarize them here.

The proposed low-energy seismic survey will involve one source vessel, the *Palmer*, which would deploy a two (each with a discharge volume of 45 cubic inch [in^3] with a total volume of 90 in^3 or each with a discharge volume of 105 in^3 with a total volume of 210 in^3) Sercel Generator Injector (GI) airgun array as an energy source at a tow depth of 3 m (9.8 ft) below the surface. The acoustic receiving system will consist of one 100 m (328.1 ft) long, 24-channel, solid-state hydrophone streamer towed behind the vessel. 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/USGS, 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 hydrophone streamers would receive the returning acoustic signals and transfer the data to the on-board processing system. The Principal Investigators are Dr. Amy Leventer of Colgate University, Dr. Donald Blankenship and Dr. Sean Gulick of the University of Texas at Austin, Dr. Eugene Domack of the University of South Florida, Mr. Bruce Huber of Columbia University, and Dr. Alejandro Orsi of Texas A&M Research Foundation.

Sea ice conditions will dictate areas where the ship and airguns can operate. Due to dynamic ice conditions, which cannot be predicted on a local scale, it is not possible to develop tracklines a priori. The seismic survey would be conducted in one or both of the two study areas depending on the sea ice conditions; however, the preferred study area is the Totten Glacier region. The seismic surveys are scheduled to occur for a total of less than or equal to 300 hours at one or both of the two study areas for approximately 45 operational days in January to March 2014. The operation hours and survey length would include equipment testing, ramp-up, line changes, and repeat coverage. The long transit time between port and the study site constrains how long the ship can be in the study area and effectively limits the maximum amount of time the airguns can operate. All planned seismic data acquisition activities will be conducted by technicians provided by NSF and ASC with onboard assistance by the scientists who have planned the study. The vessel will be self-contained, and the crew will live aboard the vessel for the entire cruise.

The *Palmer* would deploy the pair of GI airguns as the primary energy source and they would be spaced approximately 3 or 6 m (9.8 or 19.7 ft) apart, side-by-side, between 15 and 40 m (49.2 and 131.2 ft) behind the vessel, at a depth of up to 3 m during the surveys. If needed to improve penetration of the strata, the two airguns may be reconfigured to a displacement volume of 105 in^3 each and would still be considered a low-energy acoustic source as defined in the NSF/USGS PEIS. Therefore, there are three possible two airgun array configurations: two 45/45 in^3 airguns separated by 3 m, two 45/45 in^3 airguns separated by 6 m, and two 105/105 in^3 airguns separated by 3 m. The two 45/45 in^3 airguns separated by 3 m layout is preferred, the two 45/45 in^3 separated by 6 m layout would be used in the event the middle of the three 45/45 in^3 airgun fails, and the two 105/105 in^3 airguns separated by 3 m would be used only if additional penetration is needed. To summarize, two strings of GI airguns would be available: (1) three 45/45 in^3 airguns on a single string where one of these is used as a “hot spare” in the event of failure of one of the other two airguns, these three GI airguns are separated by 3 m; and (2) two 105/105 in^3 airguns on a second string without a “hot spare.” The total effective volume will be 90 or 210 in^3 . The two strings would be spaced 14 m (45.9 ft) apart, on either side of the midline of the vessel, however, only one string at a time would be used. Seismic pulses would be emitted at intervals of approximately 5 seconds (12.5 m [41 ft]). At a speed of 5 knots (9.3 km/hour), the 5 second spacing would correspond to a shot interval of approximately 12.5 m (41 ft) during the study (see Figure 2-14, page 2-28 in the NSF’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/USGS, 2011). There would be approximately 720 shots per hour.

The nominal source levels of the airgun array on the *Palmer* are 224.6 to 229.8 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 two airgun array is 230.6 dB (peak) and 235.8 dB (peak-peak). 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 factors². 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 2 to 188 Hertz (Hz).

The proposed study (e.g., equipment testing, startup, line changes, repeat coverage of any areas, and equipment recovery) would consist of approximately 2,800 km (1,511.9 nmi) of transect lines (including turns) in the survey area in the Dumont d'Urville Sea of the Southern Ocean. The *Palmer* 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. In NSF and ASC's estimated take calculations, 25% has been added for those additional operations.

The *Palmer* would also operate a single-beam and multi-beam echosounder, ADCP, and a 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. This sound source would be operated continuously from the *Palmer* throughout the cruise between the first and last survey sites. The nominal source levels for the single-beam echosounder and multi-beam echosounder, ADCP, and sub-bottom profiler are 242 dB re: 1 μPa , 223.6 dB re: 1 μPa and 222 dB re: 1 μPa , respectively.

2.2.3 CORE AND DREDGE SAMPLING DESCRIPTION AND DEPLOYMENT

The primary sampling goals involve the acquisition of marine sediment cores of various lengths up to 25 m (82 ft). It is anticipated that up to 65 sediment cores and grab samples and 12 rock dredge samples would be collected as summarized in Table 1 (Table 3 of the IHA application). Each core or grab sample would require approximately one hour per sample. All cores and dredges would be deployed using a steel cable/winch system.

Approximately 75 m² (807.3 ft²) of seafloor would be disturbed by each of four deployments of the dredge at three different sites (resulting in a total of 900 m² [9,687.5 ft²] of affected seafloor for the project). The selection of the bottom sampling locations and sampling method would be based on observations of the seafloor, subsurface reflectivity, sediment type, and accessibility due to ice and weather conditions. Bottom sampling in the Mertz Glacier area would be limited to strategically selected locations including possible re-sampling at a previous core site.

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 . $\text{SPL (in decibels [dB])} = 20 \log (\text{pressure/reference pressure})$. 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.

Table 1. Proposed coring and dredging activities in the Dumont d’Urville Sea.

Sampling Device	Number of Deployments
Smith-MycIntyre grab sampler	10 to 15
Multi-corer (Mega-corer)	10 to 15
Kasten corer (regular or jumbo)	20 to 25
Jumbo piston corer	8 to 10
Box cage dredge	10 to 12

Limited sampling of rock material would be conducted using a dredge that would be towed along the seafloor for short distances (approximately 50 m [164 ft]) to collect samples of bedrock and ice rafted debris. The available dredges, which have openings of 0.5 to 1.5 m (1.6 to 4.9 ft), would be deployed on rocky substrates. The locations of the proposed dredge sites are limited to the inner shelf (southern) perimeter of three areas: the Mertz Trough and two regions along the Sabrina Coast. Final selection of dredge sites will include review to ensure that the seamounts or corals in the area are avoided (AOA, 2011).

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has adopted conservation measures (i.e., 22-06, 22-07, and 22-09) to protect vulnerable marine ecosystems (VME), which include seamounts, hydrothermal vents, cold water corals, and sponge fields. The conservation measure 22-07 includes mitigation and reporting requirements if VME are encountered. The science team would follow these requirements (see Attachment C of the IHA application) if VME’s are encountered while sampling the sea bottom.

In addition, a camera and towed video system would be deployed at up to 25 sites. This device would lightly touch the seafloor to establish a baseline and rise to an optimum elevation to obtain the desired images.

2.2.4 WATER SAMPLING AND CURRENT MEASUREMENTS DESCRIPTION AND DEPLOYMENT

High-resolution conductivity, depth, and temperature (CTD) measurements would be collected to characterize the summer regional water mass stratification and circulation, and the meridional exchange of waters between the oceanic and shelf regimes. These physical measurements would involve approximately SeaBird CTD system casts including the use of a lowered ADCP (LADCP).

The LADCP would consist of two Teledyne RDI Workhorse Monitor ADCPs mounted on the CTD/rosette frame and one oriented upward and the other downward. The LADCP and frame would be raised and lowered by cable and winch. The LADCPs would operate at a frequency of 307.2 kHz, with an estimated output acoustic pressure along each 4 beams of 216.3 dB re 1 μ Pa at 1 m. The beams are angled at 20 degrees from the centerline of the ADCP head, with a beam angle of 4 degrees for the individual beams. Typical pulse duration is 5.7 ms, with a typical repetition rate of 1.75 s. The upward and downward-looking ADCPs are operated in master-slave mode so that only one head pings at a time. The LADCP would be operated approximately one hour at every CTD/rosette station (maximum of 100 stations) for a total of 100 hours of operation.

These instruments would be used to profile the full water column for temperature, salinity (conductivity), dissolved oxygen and currents at a series of transects in the study area. Discrete

water samples would be collected for salinity and dissolved oxygen to monitor CTD/rosette performance, and for oxygen isotopes to assess meltwater content. Water samples would also be collected for development and interpretation of marine sediment proxies using Niskin bottles.

Observations of the thermal structure along other portions of the cruise track would be made using an underway CTD system and XBTs while the seafloor is swath-mapped. The number and spacing of stations would be adjusted according to ocean features discovered through multi-beam swath mapping and the sea ice conditions. If portions of the study area are inaccessible to the NBP, a contingency sampling focused on the inflows of MDCW would be pursued in adjacent shelf troughs.

It is noted that underway ADCP on the *Palmer* can, under ideal conditions, obtain profiles of ocean currents to depths greater than 800 m (2,624.7 ft). On continental shelves where depths may be less than the range of the ADCP, the underway profiles cannot resolve the deepest 15% of the water column due to side lobe reflections from the bottom which contaminate the water column Doppler returns. For a depth of 800 m, expected in the MCDW, currents in the lower 120 m (393.7 ft) could not be measured by the ship ADCP; therefore, the lowered ADCP can provide accurate current profiles to within a few meters of the bottom and provide complete coverage of the velocity field at each CTD station.

2.2.5 INSTRUMENTATION MOORINGS DESCRIPTION AND DEPLOYMENT

Four instrumented moorings would be deployed during the proposed cruise to measure current, temperature, and salinity (conductivity) continuously. Two of the moorings would be deployed for approximately one month (short-term moorings) and two moorings would be deployed for approximately one year (long-term moorings). The two short-term moorings and one long-term mooring would include ADCP paired with CTD recorders, and additional intermediate T (i.e., temperature) recorders. The characteristics of the ADCP units deployed on the moorings are similar to the Teledyne VM-150; the moored ADCPs operate at frequencies of 75 kHz (one unit) and 300 kHz (two units). The ADCP Teledyne RDI VM-150 is also considered the sub-bottom profiler. The fourth mooring would be equipped with sediment traps, a CTD recorder and intermediate T recorders, and be deployed for approximately one year (long-term mooring). The two long-term moorings would be retrieved approximately one year later by a U.S. Arctic Program (USAP) vessel or collaborators from other countries.

Subject to sea ice conditions, these moorings would preferably be placed in front of Totten Glacier, but otherwise as close as possible inside adjacent cross-shelf troughs. If access to the inner shelf is not allowed by sea ice conditions we would attempt mooring deployments within the outer shelf close to the troughs mouth, where the Totten Glacier is more directly connected to inflows from the oceanic domain offshore. The two long-term moorings would be deployed within 16 km of each other. The short-term moorings would be within a few kilometers of each other and no farther than 32 km (17.3 nmi) from the long-term moorings. All instruments would be kept at depths below 250 m (820.2 ft) to minimize damage or loss by icebergs.

The moorings would temporarily attached to anchors and be recovered using acoustic release mechanisms. The mooring recovery process would be similar regardless of mooring type or when they would be retrieved. Locating the moorings and releasing the moorings from the steel railroad wheel anchors (which would not be recovered) would be accomplished by transmitting sound over a period of several seconds. This is done with an acoustic deck command unit that

sends a sequence of coded pulses to the receiving units, the acoustic releases, connected to the mooring anchors. The acoustic releases response to acknowledge the receipt of commands from the deck unit is by transmitting a short sequence of pulses back. Both of the acoustic units (onboard deck unit and moored releases) operate at frequencies between approximately 7 and 15 kHz. The beam pattern is approximately omnidirectional. The acoustic source level is less than 192_dB re 1µPa at 1 m.

In addition to the U.S. moorings described above, three new moorings would be deployed on behalf of Australia's national science agency the Commonwealth of Scientific and Industrial Research Organisation (CSIRO) Physical Oceanography group in the Totten Glacier region by the project team. These moorings would be retrieved approximately one year later by collaborators from other countries. Also, during this cruise, three CSIRO moorings that were deployed over a year ago in the western outlet of the Mertz-Ninnis Trough would be recovered. The recovery process and acoustic sources described above for the U.S. moorings would be used for recovery of the CSIRO moorings.

2.2.6 ICEBREAKING ACTIVITIES

Icebreaking is considered by NMFS to be a continuous sound and NMFS estimates that harassment occurs when marine mammals are exposed to continuous sounds at a received sound level of 120 dB SPL or above. Potential takes of marine mammals may ensue from icebreaking activity in which the *Palmer* is expected to engage in Antarctic waters (i.e., along the George V and Oates Coast of East Antarctica, >65° South, between 140° and 165° East). While breaking ice, the noise from the ship, including impact with ice, engine noise, and propeller cavitation, will exceed 120 dB (rms) continuously. If icebreaking does occur in Antarctic waters, NMFS, NSF and ASC expect it will occur during transit and non-seismic operations to gain access to coring, dredging, or other sampling locations and not during seismic airgun operations. The research activities and associated contingencies are designed to avoid areas of heavy sea ice condition. The buffer zone (160 dB [rms]) for the marine mammal Level B harassment threshold during the proposed airgun activities is smaller than the calculated radius during icebreaking. If the *Palmer* breaks ice during the survey within the Antarctic waters (within the Dumont d'Urville Sea or other areas of the Southern Ocean), seismic airgun operations will not be conducted concurrently.

In 2008, acousticians from Scripps Institution of Oceanography Marine Physical Laboratory and University of New Hampshire Center for Coastal and Ocean Mapping conducted measurements of SPLs of the *Healy* icebreaking under various conditions (Roth and Schmidt, 2010). The results indicated that the highest mean SPL (185 dB) was measured at survey speeds of 4 to 4.5 kts in conditions of 5/10 ice and greater. Mean SPL under conditions where the ship was breaking heavy ice by backing and ramming was actually lower (180 dB). In addition, when backing and ramming, the vessel is essentially stationary, so the ensonified area is limited for a short period (on the order of minutes to tens of minutes) to the immediate vicinity of the vessel until the ship breaks free and once again makes headway.

The 120 dB received sound level radius around the *Healy* while icebreaking was estimated by researchers (USGS, 2010). Using a practical spreading model, a source level of 185 dB decays to 120 dB at approximately 21,544 m (70,684 ft). (Note: The proposed IHA used a spherical spreading model that predicted a distance of 1,750 m to 120 dB in deep water depths, this model was corroborated by Roth and Schmidt [2010]). A practical spreading model is now being used

since the survey is occurring in intermediate water depths.). Therefore, as the ship travels through the ice, a swath 21.54 km (11.63 nmi) wide would be subject to sound levels greater than or equal to 120 dB. This results in potential exposure of 21,540 km² (6,380.1 nmi²) to sounds greater than or equal to 120 dB from icebreaking.

Data characterizing the sound levels generated by icebreaking activities conducted by the *Palmer* are not available; therefore, data for noise generating from an icebreaking vessel such as the U.S. Coast Guard Cutter (USCGC) *Healy* will be used as a proxy. It is noted that the *Palmer* is a smaller vessel and has less icebreaking capability than the U.S. Coast Guard's other polar icebreakers, being only capable of breaking ice up to 1 m thick at speeds of 3 kts (5.6 km/hr or 3 nmi). Therefore, the sound levels that may be generated by the *Palmer* are expected to be lower than the conservative levels estimated and measured for the *Healy*. Researchers will work to minimize time spent breaking ice as science operations are more difficult to conduct in icy conditions since the ice noise degrades the quality of the seismic and ADCP data and time spent breaking ice takes away from time supporting scientific research. Logistically, if the vessel were in heavy ice conditions, researchers would not tow the airgun array and streamer, as this would likely damage equipment and generate noisy data. It is possible that the seismic survey can be performed in low ice conditions if the *Palmer* could generate an open path behind the vessel.

Because the *Palmer* is not rated to break multi-year ice routinely, operations generally avoid transiting through older ice (i.e., 2 years or older, thicker than 1 m). If sea ice is encountered during the cruise, it is anticipated the *Palmer* will proceed primarily through one year sea ice, and possibly some new, very thin ice, and would follow leads wherever possible. Satellite imagery from the Totten region documents that sea ice is at its minimum extent during the month of February. The most recent image for the region, from November 21, 2013, shows that the sea ice is currently breaking up, with a significant coastal lead of open water. Based on a maximum sea ice extent of 250 km (135 nmi) and estimating that NSF and ASC will transit to the innermost shelf and back into open water twice, a round trip transit in each of the potential work regions, NSF and ASC estimate that the *Palmer* will actively break ice up to a distance of 1,000 km (540 nmi). Based on a ship's speed of 5 kts under moderate ice conditions, this distance represents approximately 108 hrs of icebreaking operations. It is noted that typical transit through areas primarily open water and containing brash ice or pancake ice will not be considered icebreaking.

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 IHA (valid from January through April 2014) to NSF and ASC allowing the incidental take, by Level B harassment, of 14 species of marine mammals during the approximately 45-operational day low-energy seismic survey subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHA, if issued.

The NSF and ASC's analyses and our *Federal Register* notice requesting comments on the proposed IHA (79 FR 464, January 3, 2014) 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 IHA, if issued, in the following sections.

We preliminarily determined, under section 101(a)(5)(D) of the MMPA that the measures included in the proposed IHA were sufficient to reduce the effects of NSF and ASC'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 NSF and ASC's action would have a negligible impact on the affected species or stocks (79 FR 464, January 3, 2014).

We have not altered the mitigation, monitoring and reporting requirements to be included in the final IHA; 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 IHA with Mitigation Measures) would satisfy the purpose and need of our proposed action under the MMPA—issuance of an IHA, along with required mitigation measures and monitoring, and would enable us, the NSF and ASC 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, NSF and ASC 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 (PSOs);
- (2) shut-down procedures when PSOs detect marine mammals within or about to enter the exclusion zones while the airgun array is operating;
- (3) ramp-up procedures; and
- (4) speed or course alterations to avoid marine mammals entering the exclusion zone(s).

Proposed Buffer and 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 (rms) of all sound amplitudes measured over the duration of an impulse with a base unit of decibels referenced to one micropascal (re: 1 μ Pa (rms)); the relevant thresholds for NSF and ASC's action are 190 dB re: 1 μ Pa (rms) for potential injury to pinnipeds; 180 dB re: 1 μ Pa (rms) for potential injury to cetaceans; and 160 dB re: 1 μ Pa (rms) for potential Level B (behavioral) harassment from pulsed sounds (e.g., airguns). The relevant thresholds for NSF and ASC's action are 120 dB re: 1 μ Pa (rms) for potential Level B (behavioral) harassment from continuous sounds (e.g., icebreaking).

NSF and ASC will establish a 160, 180, and 190 dB re 1 μ Pa (rms) buffer and exclusion zone for marine mammals, cetaceans, and pinnipeds, respectively, before starting the two GI airgun array (90 or 210 in³) based upon the modeled radii in their IHA application and shown here in Table 3. NSF and ASC will also establish a 120 dB re 1 μ Pa (rms) for marine mammals before beginning icebreaking activities. Using a practical spreading model based on a source level of 185 dB, the predicted 120 dB buffer zone for icebreaking activities is 21,544 m (70,684 ft).

Table 2. Measured (array) and predicted (single airgun) distances by L-DEO to which sound levels greater than or equal to 160, 180, and 190 dB re: 1 μ Pa could be received in intermediate and deep water during the proposed low-energy seismic survey in the Dumont d'Urville Sea of the Southern Ocean, during January through March 2014.

Source and Total Volume (in ³)	Tow Depth (m)	Water Depth (m)	Predicted RMS Radii Distances ¹ (m)		
			160 dB	180 dB	190 dB
Two 45 in ³ GI Airguns (90 in ³)	3	Intermediate (100 to 1,000)	600 (1,968.5 ft)	100 (328 ft)	100 (328 ft)
Two 45 in ³ GI Airguns (90 in ³)	3	Deep (>1,000)	400 (1,312.3 ft)	100 (328 ft)	100 (328 ft)
Two 105 in ³ GI Airguns (210 in ³)	3	Intermediate (100 to 1,000)	1,005 (3,297.2 ft)	100 (328 ft)	100 (328 ft)
Two 105 in ³ GI Airguns (210 in ³)	3	Deep (>1,000)	670 (2,198.2 ft)	100 (328 ft)	100 (328 ft)

NMFS has determined that for acoustic effects, using acoustic thresholds in combination with corresponding exclusion zones are an effective way to consistently apply measures to avoid or minimize the impacts of an action. NSF and ASC uses the thresholds to establish a mitigation shut-down or exclusion zone, i.e., if an animal enters or about to enter an area calculated to be ensonified above the level of an established threshold a sound source is shut-down.

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

Ramp-Up Procedures: NSF and ASC would initiate a ramp-up procedure, beginning with a single airgun in the array and then adding the second airgun after five minutes when beginning operations, and after a specified period (approximately 15 minutes) of non-active airgun operations when a shut-down has exceeded that period. SIO, USGS, and L-DEO have used similar periods during previous surveys.

Speed and/or Course Alteration: If a marine mammal is detected outside the applicable exclusion zone and, based on its position and the relative direction of travel, is likely to enter the exclusion zone, NSF and ASC would consider changes of the vessel's speed and/or direct course if this does not compromise operational safety. This would be done if operationally practicable while minimizing the effect on the planned science objectives. 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 further course alterations or shut-down of the airgun(s).

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

PSOs would record data to estimate the numbers of marine mammals exposed to various received sound levels and to document reactions or lack thereof. PSOs would also observe during daytime periods when the seismic system is not operating and/or icebreaking is occurring 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. NSF and ASC would use the data to estimate numbers of animals potentially ‘taken’ by harassment (as defined in the MMPA).

REPORTING MEASURES

NSF and ASC would submit a comprehensive report to NMFS and the NSF 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 (i.e., dates, times, locations, activities, and associated seismic survey and icebreaking 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 IHA (if issued), such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), SIO shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources. NSF and ASC 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 (C.F.R. § 1502.14). 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 IHA to NSF and ASC for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of a low-energy seismic survey in international waters in the Dumont d’Urville Sea off the coast of East Antarctica, February through March 2014. For the purposes of this EA, NMFS assumes under the No Action Alternative that NSF and ASC would conduct the proposed low-energy seismic survey without an exemption from the MMPA against the take of marine mammals. NMFS also assumes that NSF and ASC will conduct the low-energy seismic survey in the absence of the protective monitoring and mitigation measures for marine mammals that would be required by the IHA.

2.3.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

We also considered an alternative whereby we issue the IHA for another time. However, this alternative failed to meet the statutory and regulatory requirements of the MMPA for an IHA as NSF and ASC did not request nor submit an application (i.e., under the MMPA the Secretary shall issue an IHA upon request) to conduct the seismic survey at an alternate time. Further, the NSF in its 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct*

Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics (AECOM, 2013) considered an alternative to conducting the project at another time.

The proposed dates for the cruise (January through March 2014) are the most suitable dates that would best meet the purpose and need for the applicant, from a logistical perspective, for NSF and ASC, the *Palmer* and its crew. Because the proposed dates for the cruise (45 operational days in January to March 2014) 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 NSF and ASC's 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies in the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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 Dumont d'Urville Sea in International Waters of the Southern Ocean. The proposed study sites are the Totten Glacier and Moscow University Ice Shelf areas and/or Mertz Glacier and Cook Ice Shelf areas. The Totten Glacier is approximately 60 km (37.3 nmi) long and 30 km (18.6 mi) wide, while the Moscow University Ice Shelf is a narrow ice shelf, approximately 200 km long, located between Totten Glacier and Paulding Bay. Water depths in the Totten Glacier study area range from approximately 100 m to approximately 1,000 m. The Totten Glacier is located on the eastern side of Law Dome and drains northeastward from the continental ice but turns northwestward at the coast where it terminates in a prominent tongue east of Cape Waldron. The Totten Glacier discharges up to 70 Gt yr⁻¹ of fresh glacial meltwater into the ocean. Its maximum thickness at the grounding line is approximately 2.5 km (1.6 mi) in the region where the glacier departs the continental ice sheet and begins to float and is nearly 200 m (656.2) thick at the calving front, 150 km (93.2 mi) to the north. Recent measurements show that the Totten Glacier is thinning at up to 1.9 m (6.2 ft) per year. The direct cause is not yet known, but is believed to be ocean driven, derived from the Modified Circumpolar Deep Water.

Once on the continental shelf, and the appropriate bathymetric pathways to reach the glacier, Modified Circumpolar Deep Water, which is denser than the surrounding shelf water masses, is able to sink to the grounding line of the glacier and cause increased melting and rapid glacier acceleration. This is also suspected to be the key cause of the increased melting of other ice shelves showing rapid thinning, such as the Pine Island Glacier in the Amundsen Sea region of West Antarctica.

Warm Modified Circumpolar Deep Water flows onto the shelf break and towards the eastern side and continues westward around Law Dome. The melt rates for the Totten Glacier Ice Shelf were calculated using a model developed to examine thermodynamic interaction (Gwyther et al., 2011). The model predicted melt rates of more than 50 m (164 ft) per year occurring at the deepest part of the ice shelf.

Open water conditions are generally expected to be present in the study areas. The sea ice conditions in the region, based on analysis from satellites, ships, continental stations, and synoptic modeling, can vary significantly from year to year. Wind, currents and tides would influence sea ice coverage.

The Mertz Glacier is about 72 km (44.7 mi) long and approximately 32 km (19.9 mi) wide, and is characterized by a large tongue that extends to the sea. The Cook Ice Shelf is about 90 km (55.9 mi) wide, located between Cape Freshfield and Cape Hudson. Water depths in this region range up to 2 km (1.2 mi) deep; however, the seismic survey would be conducted in waters 100 to 1,000 m deep.

Within the Mertz Glacier region, dense saltwater forms at the surface, sinks, and is influenced by the Mertz polynya (i.e., an area of open-water or low sea ice concentration), which derives deep over-turning ocean circulation. The migration of sea ice in the region is strongly influenced by the polynya which routinely forms along the western margin of the Mertz Glacier tongue. This polynya is created by persistent katabatic winds which transport sea ice westward away from the coast.

The area around the Mertz Glacier is biologically active. The ice-free waters of the polynya allow light to reach the ocean surface and stimulate primary production. The high biological productivity attracts whales, penguins, and seals to feed on plankton in one of the few areas not covered by ice in the Antarctic winter.

More information on the physical conditions and marine mammals habitat in the Dumont d'Urville study areas can be found in NSF's *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (available at: http://www.nmfs.noaa.gov/pr/pdfs/permits/nsf_totten_ieeea_revised.pdf), which we incorporate here by reference.

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 14 marine mammal species under our jurisdiction that may occur in the proposed survey area, including 5 mysticetes (baleen whales), 5 odontocetes (toothed whales, dolphins, and porpoises), and 4 pinnipeds (seals and sea lions) during January through March 2014. More information on the status, abundance, and seasonal distribution of the stocks or species of marine mammals likely to be affected by the proposed activities can be found in NSF's *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (available at: http://www.nmfs.noaa.gov/pr/pdfs/permits/nsf_totten_ieeea_revised.pdf), which we incorporate here by reference.

We presented this information earlier in Section 1.1.2 in this EA and in Tables 3 in the *Federal Register* notice requesting comments on the proposed IHA (79 FR 464, January 3, 2014) and we incorporate those descriptions by reference here. Table 3 (see below) presents information on the habitat, regional abundance, and conservation and population status of marine mammals that may occur in or near the proposed low-energy seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica.

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, sei, and sperm whales (see Table 4 below). More information on the blue, fin, humpback, sei and sperm whales in the proposed study area can be found below:

Blue whale – The blue whale is also considered rare in the Southern Hemisphere (Sears and Perrin, 2009). Blue whales arrive in the Antarctic feeding grounds each austral summer, and some probably migrate pass 60° South during early austral summer (October to November). Visual and acoustic surveys conducted by the IWC in Antarctic waters recorded 710 blue whale calls in January 2002 and 2,559 calls in February 2002. Blue whales begin migrating north out of the Antarctic to winter breeding grounds earlier than fin and sei whales.

Fin whale – Northern and southern fin whale populations are distinct, and are sometimes recognized as different sub-species (Aguilar, 2009). Fin whales migrate in the open oceans and their winter breeding areas are mostly uncertain. Fin whales likely migrate south beyond 60° South during early to mid-austral summer, arriving on more southern feeding grounds after blue whales. The distribution of fin whales during the austral summer ranges from 40 to 60° South in the southern Indian and South Atlantic Oceans and 50 to 60° South in the South Pacific Ocean. The New Zealand stock summers from 170° East to 145° West. Fin whales migrate north before the end of austral summer toward breeding grounds in and around the Fiji Sea.

Humpback whale – Southern hemisphere humpback whales typically feed near 60° South during austral summer (December to March). However, a small number of late- or early-migrating whales may pass further south of the area during early or late austral summer based on the species typical migration patterns. Animals using this region are likely part of the Area V stock that breeds in and around French Polynesia, the Cook Islands, and Tonga. Humpbacks that winter off New Calcedonia and Tonga are estimated to number only in the few hundreds.

Sei whale – Sei whales are generally not found north of 30° South in the southern hemisphere and could visit the proposed study area in the Southern Ocean during the austral summer (Reeves et al., 1999). Their main summer feeding concentration occurs between 40 and 50° South. No breeding grounds have been identified for sei whales anywhere in its range; however, calving is thought to occur from September to March.

Sperm whale – Sperm whales, consisting of solitary males and mixed sex/age classes, are likely to occur in the Southern Ocean during the austral summer. Young calves could also be present during summer. A single group of four sperm whales was sighted in February 2005 during an NSF-funded SIO academic seismic survey in the southwest Pacific Ocean. Female and immature sperm whales generally occur at tropical and temperate latitudes of 50° North to 50° South, while solitary adult males are found to 75° North and 75° South. Home ranges of individual females span distances up to 1,000 km (540 nmi); however, some females travel several thousand miles across large parts of an ocean basin. Sperm whales generally occur in waters greater than 180 m (590 ft) deep; waters in the sub-Antarctic to the Antarctic coastal shelf are greater than 1,000 m (3,280 ft) deep.

Table 3. The habitat, regional abundance, and conservation status of marine mammals that may occur in or near the proposed low-energy seismic survey area in the Antarctic area of the Southern Ocean. (See text and Table 4 in NSF and ASC’s application for further details.)

Species	Habitat	Population Estimate	ESA ¹	MMPA ²	Population Trend
Mysticetes					
Southern right whale (<i>Eubalaena australis</i>)	Coastal, pelagic	8,000 ³ to 15,000 ⁴	EN	D	Increasing
Pygmy right whale (<i>Caperea marginata</i>)	Coastal, pelagic	NA	NL	NC	NA
Humpback whale (<i>Megaptera novaeangliae</i>)	Pelagic, nearshore waters, and banks	35,000 to 40,000 ³ - Worldwide 9,484 ⁵ – Scotia Sea and Antarctica Peninsula	EN	D	Increasing
Dwarf minke whale (<i>Balaenoptera acutorostrata</i> sub-species)	Pelagic and coastal	NA	NL	NC	NA
Antarctic minke whale (<i>Balaenoptera bonaerensis</i>)	Pelagic, ice floes	Several 100,000 ³ - Worldwide 18,125 ⁵ - Scotia Sea and Antarctica Peninsula	NL	NC	Stable
Bryde’s whale (<i>Balaenoptera brydei</i>)	Pelagic and coastal	NA	NL	NC	NA
Sei whale (<i>Balaenoptera borealis</i>)	Primarily offshore, pelagic	80,000 ³ - Worldwide	EN	D	NA
Fin whale (<i>Balaenoptera physalus</i>)	Continental slope, pelagic	140,000 ³ - Worldwide 4,672 ⁵ - Scotia Sea and Antarctica Peninsula	EN	D	NA
Blue whale (<i>Balaenoptera musculus</i>)	Pelagic, shelf, coastal	8,000 to 9,000 ³ - Worldwide 1,700 ⁶ - Southern Ocean	EN	D	NA
Odontocetes					
Sperm whale (<i>Physeter macrocephalus</i>)	Pelagic, deep sea	360,000 ³ - Worldwide 9,500 ³ - Antarctic	EN	D	NA
Pygmy sperm whale (<i>Kogia breviceps</i>)	Pelagic, slope	NA	NL	NC	NA
Arnoux’s beaked whale (<i>Berardius arnuxii</i>)	Pelagic	NA	NL	NC	NA
Blainville’s beaked whale (<i>Mesoplodon densirostris</i>)	Pelagic	NA	NL	NC	NA
Cuvier’s beaked whale (<i>Ziphius cavirostris</i>)	Pelagic	NA	NL	NC	NA
Shepherd’s beaked whale (<i>Tasmacetus shepherdi</i>)	Pelagic	NA	NL	NC	NA

Southern bottlenose whale (<i>Hyperoodon planifrons</i>)	Pelagic	500,000 ³ – South of Antarctic Convergence	NL	NC	NA
Andrew's beaked whale (<i>Mesoplodon bowdoini</i>)	Pelagic	NA	NL	NC	NA
Hector's beaked whale (<i>Mesoplodon hectori</i>)	Pelagic	NA	NL	NC	NA
Gray's beaked whale (<i>Mesoplodon grayi</i>)	Pelagic	NA	NL	NC	NA
Strap-toothed beaked whale (<i>Mesoplodon layardii</i>)	Pelagic	NA	NL	NC	NA
Spade-toothed beaked whale (<i>Mesoplodon traversii</i>)	Pelagic	NA	NL	NC	NA
Killer whale (<i>Orcinus orca</i>)	Pelagic, shelf, coastal, pack ice	80,000 ³ – South of Antarctic Convergence 25,000 ⁷ - Southern Ocean	NL	NC	NA
Long-finned pilot whale (<i>Globicephala melas</i>)	Pelagic, shelf, coastal	200,000 ^{3,8} – South of Antarctic Convergence	NL	NC	NA
Bottlenose dolphin (<i>Tursiops truncatus</i>)	Offshore, inshore, coastal, estuaries	>625,500 ³ - Worldwide	NL	NC	NA
Southern right whale dolphin (<i>Lissodelphis peronii</i>)	Pelagic	NA	NL	NC	NA
Dusky dolphin (<i>Lagenorhynchus obscurus</i>)	Coastal, continental shelf and slope	NA	NL	NC	NA
Hourglass dolphin (<i>Lagenorhynchus cruciger</i>)	Pelagic, ice edge	144,000 ³	NL	NC	NA
Spectacled porpoise (<i>Phocoena dioptrica</i>)	Coastal, pelagic	NA	NL	NC	NA
Pinnipeds					
Crabeater seal (<i>Lobodon carcinophaga</i>)	Coastal, pack ice	5,000,000 to 15,000,000 ^{3,9}	NL	NC	Increasing
Leopard seal (<i>Hydrurga leptonyx</i>)	Pack ice, sub-Antarctic islands	220,000 to 440,000 ^{3,10}	NL	NC	NA
Ross seal (<i>Ommatophoca rossii</i>)	Pack ice, smooth ice floes, pelagic	130,000 ³	NL	NC	NA
Weddell seal (<i>Leptonychotes weddellii</i>)	Fast ice, pack ice, sub-Antarctic	500,000 to 1,000,000 ^{3,11}	NL	NC	NA

	islands				
Southern elephant seal (<i>Mirounga leonina</i>)	Coastal, pelagic, sub-Antarctic waters	640,000 ¹² to 650,000 ³	NL	NC	Decreasing, increasing or stable depending on breeding population
Antarctic fur seal (<i>Arctocephalus gazella</i>)	Shelf, rocky habitats	1,600,000 ¹³ to 3,000,000 ³	NL	NC	Increasing

NA = Not available or not assessed.

¹ U.S. Endangered Species Act: EN = Endangered, T = Threatened, DL = Delisted, NL = Not listed.

² U.S. Marine Mammal Protection Act: D = Depleted, S = Strategic, NC = Not Classified.

³ Jefferson et al., 2008.

⁴ Kenney, 2009.

⁵ Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) survey area (Reilly et al., 2004)

⁶ Sears and Perrin, 2009.

⁷ Ford, 2009.

⁸ Olson, 2009.

⁹ Bengston, 2009.

¹⁰ Rogers, 2009.

¹¹ Thomas and Terhune, 2009.

¹² Hindell and Perrin, 2009.

¹³ Arnould, 2009.

3.2.2 PROTECTED SPECIES (OTHER THAN MARINE MAMMALS)

More information on five species of ESA-listed sea turtles (i.e., leatherback [*Dermochelys coriacea*], green [*Chelonia mydas*], loggerhead [*Caretta caretta*], hawksbill [*Eretmochelys imbricata*], and olive ridley [*Lepidochelys olivacea*]), six seabird families (i.e., albatrosses, petrels/shearwaters, diving petrels, gannets/boobies, gulls, and terns/noddies), and two species of penguin (i.e., Adellie penguin [*Pygoscelis adeliae*] and Emperor penguin [*Aptenodytes forsteri*]), that could occur in the sub-Antarctic area can be found in Section 3 of NSF and ASC's *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (available at: http://www.nmfs.noaa.gov/pr/pdfs/permits/nsf_totten_ieeea_revised.pdf), which we incorporate here by reference. The limited available data indicate that sea turtles hear airgun sounds and sometimes exhibit localized avoidance; however none are expected to occur in the proposed action area where airgun operations and icebreaking activities are planned. No effects are anticipated to the seabird species from the airgun array and icebreaking activities during the low-energy seismic survey.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter of the EA analyzes the impacts of the two alternatives (i.e., whether or not to issue the IHA 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 IHA for Level B harassment take of marine mammals during the seismic survey. The NSF and ASC's analyses (i.e., the 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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 IHA (79 FR 464, January 3, 2014) facilitate an analysis of the direct, indirect, and cumulative effects of our proposed issuance of an IHA.

In developing this EA, NMFS adhered to the procedural requirements of NEPA; the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508), and NOAA's (i.e., NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act) procedures for implementing NEPA.

The following definitions will be used to characterize the nature of the various impacts evaluated with this EA:

- *Short-term or long-term impacts.* These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic.
- *Direct or indirect impacts.* A direct impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.
- *Minor, moderate, or major impacts.* These relative terms are used to characterize the magnitude of an impact. Minor impacts are generally those that might be perceptible but, in their context, are not amenable to measurement because of their relatively minor character. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification or measurement. Major impacts are those that, in their context and due to their intensity (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.
- *Adverse or beneficial impacts.* An adverse impact is one having adverse, unfavorable, or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.
- *Cumulative impacts.* CEQ regulations implementing NEPA define cumulative impacts as the "impacts on the environment which result 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 taking place over a period of time within a geographic area.

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

Alternative 1 is the Preferred Alternative under which we would issue an IHA to NSF and ASC for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of a low-energy seismic survey in international waters in the Dumont d’Urville Sea of the coast of East Antarctica, January through March 2014. We would incorporate the mitigation and monitoring measures and reporting described earlier in this EA into a final IHA.

The NSF and ASC’s 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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 IHA (79 FR 464, January 3, 2014) describe, the potential effects of airgun sounds, single-beam echosounder, multi-beam echosounder, ADCP and sub-bottom profiler signals as well as icebreaking 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 seismic survey will not result in any permanent impact on habitats used by the marine mammals in the survey area, including the food sources they use (i.e., fish and invertebrates), as this impact is temporary and reversible. The main impact associated with the activity will be temporarily elevated noise levels and the associated direct effects on marine mammals. The issuance of an IHA would not affect physical habitat features, such as substrates and water quality. NMFS included a discussion of the potential effects of this action on marine mammal habitats in the notice of the proposed IHA (79 FR 464, January 3, 2014) and is incorporated here by reference.

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 impacts to marine mammals 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. We interpret these effects on marine mammals as falling, at most, within the MMPA definition of Level B (behavioral) harassment for those species managed by us. NMFS included a discussion of the potential effects of this action on marine mammals in the notice of the proposed IHA (79 FR 464, January 3, 2014) and is incorporated here by reference. This discussion includes the effects of sound from airguns on mysticetes, odontocetes, and pinnipeds including tolerance, masking, behavioral disturbance, hearing impairment, and other non-auditory physical effects.

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 pinnipeds and expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment.

NSF and ASC proposed a number of monitoring and mitigation measures for marine mammals as part of its IHA application. In analyzing the effects of the preferred alternative, we conclude that the IHA'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 (PSOs);
- (2) shut-down procedures when PSOs detect marine mammals within or about to enter the exclusion zones while the airgun is operating;
- (3) ramp-up procedures; and
- (4) speed or course alterations to avoid marine mammals entering the exclusion zone(s).

In NSF and ASC's application, they did not request authorization to take marine mammals by Level A harassment because their environmental analyses indicate 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 NSF'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, NSF and ASC'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 NSF and ASC's application, nor would we authorize take by injury, serious injury, or mortality.

Survey Timing: 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. There are no known biologically important events (e.g., calving, feeding, etc.) in the survey area during this time.

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. NSF and ASC uses the thresholds to establish a mitigation 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 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 low-energy seismic survey would result in a serious injury or mortality to any marine mammal as a result of vessel strike given the *Palmer's* slow survey speed (approximately 9.3 kilometers/hour (km/hr); 5 knots [kts]). NSF and ASC have 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 *Palmer's* slow cruising speed which is approximately 18.7 to 26.9 km/hr (10.1 to 14.5 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: NSF and ASC has requested take by Level B harassment as a result of their proposed low-energy 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 11 species of marine mammals under our jurisdiction could be potentially affected by Level B harassment over the course of the proposed IHA. For each species, these take numbers are small (most estimates are less than eight 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 45 operational days. Additionally, the low-energy 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 (i.e., less than day).

Table 4 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 4. Estimates of the densities and possible numbers of marine mammal species that might be exposed to sound levels greater than or equal to 120 dB re: 1 μ Pa (icebreaking) and 160 dB re: 1 μ Pa (airgun operations) during the proposed low-energy seismic survey in the Dumont d'Urville Sea of the Southern Ocean, during January through March 2014.

Species	Reported Sightings ^{1,2} *Sightings have been pro-rated to include unidentified animals*	Corrected Sightings (Assume 20% for Cetaceans)	Density (#/km ²)	Calculated Take from Seismic Airgun Operations (i.e., Estimated Number of Individuals Exposed to Sound Levels \geq 160 dB re 1 μ Pa) ³	Calculated Take from Icebreaking Activities (i.e., Estimated Number of Individuals Exposed to Sound Levels \geq 120 dB re 1 μ Pa) ⁴	Approximate Percentage of Population Estimate (Calculated Total Take) ⁵	Total Requested Take Authorization ⁶
Mysticetes							
Southern right whale	0	0	0	0	0	NA	0
Humpback whale	238	1,190	0.1029768	580	2,218	8.0	580 + 2,218 = 2,798
Antarctic minke whale	136	680	0.0588439	331	1,267	0.53	331 + 1,267 = 1,598
Sei whale	4	20	0.0017307	10	37	0.06	10 + 37 = 47
Fin whale	232	1,160	0.1003808	565	2,162	1.9	565 + 2,162 = 2,727
Blue whale	2	10	0.0008654	5	19	1.4	5 + 19 = 24
Odontocetes							
Sperm whale	32	160	0.0138456	78	298	3.9	78 + 298 = 376
Arnoux's beaked whale	0	0	0	0	0	NA	0
Cuvier's beaked whale	0	0	0	0	0	NA	0
Southern bottlenose whale	0	0	0	0	0	NA	0
Killer whale	62	310	0.0268259	151	578	2.9	151 + 578 = 729
Long-finned pilot whale	24	120	0.0103842	58	224	0.1	58 + 224 = 282
Hourglass dolphin	26	130	0.0112496	63	242	0.2	63 + 242 = 305
Spectacled porpoise	33	165	0.0142783	80	308	NA	80 + 308 = 388
Pinnipeds							
Crabeater seal	NA	NA	0.868000	4,885	18,697	0.5	4,885 + 18,697 = 23,582
Leopard seal	17	24	0.051486	290	1,109	0.6	290 + 1,109 = 1,399

Ross seal	42	59	0.127201	716	2,740	2.7	716 + 2,740 = 3,456
Weddell seal	NA	NA	0.0756	425	1,628	0.4	425 + 1,628 = 2,053
Southern elephant seal	0	0	0	0	0	NA	0
Antarctic fur seal	0	0	0	0	0	NA	0

NA = Not available or not assessed.

¹ Sightings from a 52 day (5,753 km²) period on the AAD BROKE-West survey during January to March 2006.

² Sightings December 3 to 16, 1999 (1,420 km² and 75,564 km²) below 60° South latitude between 110 to 165° East longitude. All sightings were animals hauled-out of the water and on the sea ice.

³ Calculated take is estimated density (reported density times correction factor) multiplied by the area ensonified to 160 dB (rms) around the planned seismic lines, increased by 25% for contingency.

⁴ Calculated take is estimated density (reported density) multiplied by the area ensonified to 120 dB (rms) around the planned transit lines where icebreaking activities may occur.

⁵ Total requested (and calculated) takes expressed as percentages of the species or regional populations.

⁶ Requested Take Authorization includes unidentified animals that were added to the observed and identified species on a pro-rated basis.

Note: Take was not requested for southern elephant seals and Antarctic fur seals because preferred habitat for these species is not within the proposed action area.

We do not expect the activity to impact rates of recruitment or survival for any affected species or stock. 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 IHA to NSF and ASC for the taking, by Level B harassment, of small numbers of marine mammals, incidental to the conduct of a low-energy seismic survey in international waters in the Dumont d'Urville Sea off the coast of East Antarctica, January through March 2014, be exempt from the MMPA's take prohibition. As a result, NSF and ASC would not receive an exemption from the MMPA. For the purposes of this EA, NMFS assumes under the No Action Alternative that NSF and ASC would conduct the proposed low-energy seismic survey without an exemption from the MMPA against the take of marine mammals. NMFS also assumes that NSF and ASC will conduct the low-energy seismic survey in the absence of the protective monitoring and mitigation measures for marine mammals that would be required by the IHA.

4.2.1 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 IHA.

If the survey proceeded without the protective monitoring and mitigation measures and reporting requirements required by a final IHA under the MMPA and ESA, the direct, indirect, or cumulative effects on marine mammals of not issuing the IHA 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 IHA;

- Incidental take of marine mammals would likely occur at levels we have already identified and evaluated in our *Federal Register* notice on the proposed IHA (79 FR 464, January 3, 2014) (see Table 5 [above] for the estimated number of individuals and takes authorized by marine mammal species). The *Federal Register* notice on the proposed IHA (79 FR 464, January 3, 2014) has a description of the potential effects on marine mammals from the acoustic stimuli that includes one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent hearing impairment, or non-auditory physical or physiological effects; and
- NMFS 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 of marine mammals; assess the anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses; and comply with the MMPA's requirement to increase the knowledge of the species.

4.3 COMPLIANCE WITH NECESSARY LAWS – NECESSARY FEDERAL PERMITS

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

Under section 7 of the ESA, the NSF 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 NSF's Division of Polar Programs and to the NMFS's Office of Protected Resources, Permits and Conservation Division. All parties must comply with the relevant terms and conditions of the ITS corresponding to the Biological Opinion issued to the NSF, ASC, and to us. NSF and ASC must comply with the mitigation and monitoring requirements included in the IHA 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 NSF and ASC's 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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 IHA (79 FR 464, January 3, 2014) 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 IHA would potentially result in unavoidable adverse impacts. However, we do not expect NSF and ASC'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 (e.g., in the Dumont d’Urville Sea of the Southern Ocean for 45 operational days).

Impacts to marine mammal populations include the following: past, present, and reasonably foreseeable future commercial whaling; altered prey base and habitat quality as a result of global climate change; past, present, and reasonably foreseeable future predation, exposure to biotoxins and the resulting bioburden; past and future research activities in the area; vessel noise and collisions; and commercial fisheries. 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 a 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).

Natural background underwater acoustic sources in Antarctic waters include the movement and grinding of ice floes, grounding of icebergs, wind, waves, precipitation, and earthquakes (SCAR, 2004). The proposed low-energy seismic survey would add another, albeit temporary activity to the marine environment in the Southern Ocean and the proposed low-energy seismic survey would be limited to a small area in the Dumont d’Urville Sea off the coast of East Antarctica for a relatively short period of time.

The NSF and ASC’s 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 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. Our analyses, which incorporate their analyses by reference and briefly summarize them here, focus on the activities that are most likely to impact the marine mammals found 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 IN THE SOUTHERN OCEAN

Other scientific research activities have been and may be conducted in this region in the foreseeable future. NSF Division of Polar Programs has low-energy seismic surveys currently

planned for the Antarctic region in September 2014 and January 2015, however NMFS has not received IHA applications for these surveys to date.

At the present time, the action proponents are not aware of other research activities planned to occur in the proposed survey area during the January to March 2014 timeframe, but research activities planned by other entities are possible, although unlikely. The proposed study site is remote and difficult to access; therefore relatively few activities are conducted in it. Within the larger region of the marine environment off the coast of East Antarctica commercial fishing, tourism, and National Antarctic Program research cruises occur. Commercial fishing and tourism both occur at very low levels, if these types of vessels are encountered it is unlikely that the proposed research would impact them. National Antarctic Program research cruises also occur in low numbers. Efforts will be made by NSF and ASC to identify such cruises and coordinate with them to reduce potential impacts. The NSF has already reached out to the National Antarctic Program, led by the Australian Antarctic Division, the program most likely to be operating in that area.

There are no other seismic surveys with an IHA from us scheduled to occur in international waters in the Dumont d'Urville Sea of the Southern Ocean, January through March 2014. 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 low-energy 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 IHA 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, VESSEL NOISE, AND COLLISIONS

Vessel traffic around the proposed study area in the Southern Ocean occurs at very low levels. The total transit distance (approximately 3,443 km [1,859.1 nmi] one-way or approximately 6,886 km [3,718.1 nmi] round-trip) by NSF and ASC's *Palmer* would be minimal relative to total transit length for vessels operating in the proposed survey area during January to March. We expect that the impacts of the of the *Palmer's* operations combined with the existing shipping operations to produce an insignificant overall ship disturbance effects on marine mammals.

4.5.3 FISHING

NSF and ASC's 2013 *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics* (AECOM, 2013) describes commercial fisheries operations in the general area of the proposed survey (Chapter 4). The Antarctic krill fishery may operate within the proposed Antarctic study areas. Many Southern Ocean fisheries are regulated by the Commission for the Conservation of Antarctic Marine Living Resources. 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. However, fishing operations at most of the proposed survey sites likely would be limited because of distance from shore. There may be some localized avoidance by marine mammals of fishing vessels near the proposed low-energy seismic survey area. NSF and ASC's operations in the proposed survey area are also limited temporally (duration of 45 operational days), and we expect that the

combination of the *Palmer*'s operations with the existing commercial fishing operations to produce an insignificant overall disturbance effect on marine mammals. Proposed survey operations and icebreaking activities should not impede commercial fishing operations and the *Palmer* would avoid fishing vessels when towing seismic equipment.

4.5.4 COMMERCIAL WHALING

Large whale and pinniped population numbers in the proposed action area have been impacted historically by commercial exploitation, mainly in the form of whaling. The development of steam-powered boats in the late 19th century, coupled with the use of the forward-mounted gun-fired harpoon, made it possible to more efficiently kill and tow ashore the larger baleen whale species such as blue, fin, and minke whales. Roman and Palumbi (2003) have reported that pre-whaling population estimates for fin and humpback whales were far greater than those previously calculated and 6 to 20 times higher than present-day population estimates. Prior to current prohibitions on whaling, such as the International Whaling Commission's (IWC) moratorium, most large whale species had been depleted to the extent that it was necessary to list them as endangered under the ESA. For instance in the southern hemisphere, commercial whalers took at least 68,000 humpback whales prior to the IWC's ban on humpback whaling in the southern hemisphere in 1966 (Bonner, 1982). As humpback whale catches dropped, blue whale catches began to climb, taking thousands of whales annually from 1914 to 1924 and by the late 1920's, tens of thousands of whales annually (Mizroch et al., 1984b). As catches of blue whales declined, whalers took on average over 20,000 whales per year from the mid-1940's through the 1960's (Mizroch et al., 1984a,b). Between 1904 and 1975, over 703,000 fin whales were harvested throughout the Antarctic (IWC, 1990). In the southern hemisphere, whalers then switched to harvesting sei whales in the 1950's and 1960's as catches of other baleen species diminished, taking more than 20,000 sei whales in 1964 (Mizroch et al., 1984a). Commercial whalers did not take large numbers of Antarctic minke whales until the early 1970s, when stocks of blue, fin, sei, and humpback whales had been depleted.

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:

Howard Goldstein
Fisheries Biologist
Permits and Conservation Division
Office of Protected Resources
NOAA, National Marine Fisheries Service
1315 East-West Hwy, Suite 13140
Silver Spring, MD 20910

CHAPTER 6 – REFERENCES

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

Finding of No Significant Impact for the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals Incidental to Conducting a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea, January to March 2014

National Marine Fisheries Service

BACKGROUND

We (National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division) propose to issue an Incidental Harassment Authorization (IHA) to the National Science Foundation (NSF) and Antarctic Support Contract (ASC), 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 low-energy marine geophysical (seismic) and icebreaking activities in international waters (i.e., high seas) in the Dumont d'Urville Sea off the coast of East Antarctica, January through March 2014.

Our proposed action results from NSF and ASC's request for an authorization to take marine mammals, by harassment, incidental to conducting a low-energy marine seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica. NSF and ASC'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.

In accordance with the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*), we completed an Environmental Assessment (EA) titled, *Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*. The EA focuses primarily on the environmental effects of authorizing the incidental take of marine mammals incidental to NSF and ASC's activities.

This EA also incorporates by reference the following documents per 40 CFR 1502.21 and NOAA Administrative Order (NAO) 216-6 § 5.09(d):

- The NSF's *Initial Environmental Evaluation/Environmental Assessment to Conduct Marine-Based Studies of the Totten Glacier System and Marine Record of Cryosphere – Ocean Dynamics*;
- The NSF'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*.

This FONSI presents our selected alternative—Alternative 1 (Preferred Alternative) titled, “Issuance of an Authorization with Mitigation Measures,” and our conclusions regarding the



impacts related to our proposed action. Based on our review of the NSF and ASC's proposed low-energy seismic survey and the mitigation and monitoring measures contained in Alternative 1, we have determined that no significant impacts to the human environment would occur from implementing the Preferred Alternative.

ANALYSIS

NAO 216-6 contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 CFR § 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below this section is relevant to making a finding of no significant impact (FONSI) and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

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

Response: Our proposed action of issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey cannot reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or EFH as defined under the MSA and identified in FMPs because no EFH has been identified in the proposed study area. The acoustic sources are not expected to affect physical habitat features, such as substrates and water quality. Additionally the effects from vessel transit, icebreaking activities, and the airgun operations of a single vessel would not result in substantial damage to ocean and coastal habitats, including marine mammal habitat. Commercial fishing, vessel traffic, tourism, and other activities in the study area generate noise throughout the year. The additional noise produced by an airgun array and icebreaking activities is comparatively minor in terms of total additional acoustic energy and will be brief relative to the other activities. The mitigation and monitoring measures required by the IHA would not affect ocean and coastal habitats or EFH.

NMFS, Office of Protected Resources, Permits and Conservation Division has determined that the issuance of an IHA for the taking of marine mammal incidental to a low-energy marine seismic survey in the Dumont d'Urville Sea off the coast of East Antarctica will not have an adverse impact on EFH; therefore, an EFH consultation is not required.

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

Response: We do not expect our proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) to have a substantial impact on biodiversity or ecosystem function within the affected environment. The effects of our proposed action would be limited to temporary behavioral responses (such as brief masking of natural sounds) and temporary changes in animal distribution. These effects would be short-term and localized.

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

Response: We do not expect our proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) to have a substantial adverse impact on public health or safety because the proposed activities would occur in the open ocean away from any populated area. The constant monitoring for marine mammals and other marine life during seismic operations effectively eliminates the possibility of any humans being inadvertently exposed to levels of sound that might have adverse effects. Although the conduct of the low-energy seismic survey may carry some risk to the personnel involved (i.e., boat or mechanical accidents during surveys), the applicant and those individuals working with the applicant would be required to be adequately trained or supervised in performance of the underlying activity (i.e., the low-energy seismic survey) to minimize such risk to personnel. The low-energy seismic survey is not expected to have any adverse impacts on traffic and transportation, as this is only a single working sound source vessel that will be at sea for a relatively short period of time (i.e., approximately 45 operational days) over a relatively small geographic area. Also, there is little risk of exposure to hazardous materials or wastes, risk of contracting diseases, or risk of damage from a natural disaster.

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

Response: Our proposed action may adversely affect 14 species of marine mammals, some of which are listed under the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.* We have determined that the proposed seismic survey may result in some Level B harassment (in the form of short-term and localized changes in behavior) of small numbers of marine mammals. The impacts of the low-energy seismic survey on marine mammals are specifically related to acoustic activities, and these are expected to be temporary in nature, and would not result in substantial impact to marine mammals or to their role in the ecosystem.

In addition, NMFS prepared a Biological Opinion under the ESA and concluded that NSF and ASC's project, including the proposed action, was not likely to jeopardize the continued existence of any listed species or adversely modify or destroy critical habitat, and this determination would not be affected by the issuance of the IHA.

The following mitigation measures will be required to minimize adverse effects to protected marine mammals:

- (1) proposed exclusion zones to avoid injury to marine mammals and visual monitoring by Protected Species Visual Observers (PSOs);
- (2) shut-down procedures when PSOs detect marine mammals within or about to enter the exclusion zone while the airgun array is operating;
- (3) ramp-up procedures; and
- (4) speed or course alteration of the vessel to avoid marine mammals entering the exclusion zone.

Taking these measures into consideration, we expect the responses of marine mammals from the preferred alternative to be limited to avoidance of the area around the seismic operations and short-term behavioral changes, falling within the MMPA definition of "Level B harassment."

We do not anticipate that marine mammal take by injury (Level A harassment), serious injury, or mortality would occur and we expect that harassment takes should be at the lowest level practicable due to the incorporation of the mitigation measures required by the IHA. For each species, the Level B harassment take numbers are small (most estimates are less than or equal to two percent) relative to the regional or overall population size of the marine mammal species or stock.

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

Response: The primary impacts to the natural and physical environment are expected to be acoustic and temporary in nature (and not significant), and not interrelated with significant social or economic impacts. Issuance of the IHA would not result in inequitable distributions of environmental burdens or access to environmental goods. We have determined that issuance of the IHA will not adversely affect low-income or minority populations. Further, there will be no impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses. Therefore, we do not expect significant social or economic effects to result from our issuance of the IHA.

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

Response: The effects of our action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) are not likely to be highly controversial. Specifically, we did not receive any comments raising substantial questions or concerns about the size, nature, or effect of potential impacts from NMFS's proposed action. Previous projects of this type required marine mammal monitoring and monitoring reports, which have been reviewed by us to ensure that activities have a negligible impact on marine mammals. In no case have impacts to marine mammals, as determined from monitoring reports, exceeded our analyses under the MMPA and NEPA.

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

Response: There are no unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, EFH, or ecologically critical areas that could be affected by the proposed action; therefore, no impacts to these resources are anticipated. Two areas in the Dumont d'Urville Sea are under consideration as designated Marine Protected Areas (MPAs) and, if adopted, would be managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). The areas contain distinctive deep-water flora and fauna and support important ecosystem roles, such as feeding areas for marine mammals, penguins, and other seabirds. These proposed MPAs are being developed by Australia, France, and the European Union for the purpose of protecting the resources and biodiversity of the East Antarctic region. The two planned MPAs encompass both of the research areas for the proposed action including the Wilkes Subregion MPA and the Oates Region MPA. It is anticipated that the MPAs may be designated as early as October 2014. In addition, CCAMLR has defined two Vulnerable Marine Ecosystems (VMEs) in the Dumont d'Urville Sea in which

bottom fishing is prohibited. Both of these locations are within the proposed study area. The proposed action would not have any substantial impact to these MPAs. There is no EFH and there are no habitats of particular concern (HAPC) in the proposed survey area. All proposed activities would occur in the marine environment and would not impact terrestrial resources. No discharges to the marine environment are proposed within the project area; therefore, there would be no impacts to water resources.

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

Response: The proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) is not likely to result in effects considered to be highly uncertain or involve unique or unknown risks.

The potential risks of low-energy seismic surveys resulting in elevated sound levels are not unique or unknown, nor is there significant uncertainty about impacts. We have issued IHAs for marine mammal take for similar types of oceanographic research seismic surveys for over 10 years, and monitoring reports received pursuant to the requirements of the IHAs have indicated that there were no unanticipated or unauthorized impacts as a result of the seismic surveys. The best available science, including input from prior monitoring reports for seismic surveys, supports our determination that adverse impacts are unlikely and will be minimized through the implementation of the proposed mitigation and monitoring requirements.

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

Response: No, our proposed action is not related to other actions with individually insignificant but cumulatively significant impacts. We expect the following combination to result in no more than minor and short-term impacts to marine mammals in the survey area in terms of overall disturbance effects: (a) our issuance of an IHA with prescribed mitigation and monitoring measures for the low-energy seismic survey; (b) past, present, and reasonably foreseeable future research in the Dumont d'Urville Sea of the Southern Ocean; (c) vessel traffic, noise, and collisions; and (d) fishing and tourism.

These activities, when conducted separately or in combination with other activities, have the potential to affect marine mammals in the study area. Any cumulative effects caused by the addition of the low-energy seismic survey impacts on marine mammals would be extremely limited and would not rise to the level of "significant," especially considering the timeframe of the proposed activities, the location of the proposed survey area away from known areas of importance to marine mammals, and the mitigation and monitoring requirements in the IHA. The low-energy seismic survey is unlikely to co-occur with any additional human activities, and thus the degree of cumulative impact would be minimal.

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

Response: The proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) would not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources as none are known to exist at the site of the proposed low-energy seismic survey and because the proposed action is not expected to alter any physical resources.

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

Response: We have determined that the proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) does not have the potential to introduce or spread non-indigenous species. The RVIB *Nathaniel B. Palmer* complies with all international and U.S. national ballast water requirements to prevent the spread of a non-indigenous species.

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

Response: Our proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) would not set a precedent for future actions with significant effects nor represent a decision in principle.

Each MMPA authorization applied for under section 101(a)(5) must contain information identified in our implementing regulations. We consider each activity specified in an application separately and, if we issue an IHA, we must determine that the impacts from the specified activity would result in a negligible impact to the affected species or stocks. Our issuance of an IHA may inform the environmental review for future projects, but would not establish a precedent or represent a decision in principle about a future consideration.

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

Response: Issuance of the IHA would not result in any violation of Federal, State, or local laws for environmental protection. We have fulfilled our section 7 responsibilities under the ESA (see response to Question 4) and the MMPA for this action.

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

Response: The proposed action (i.e., issuing an IHA for the take of marine mammals incidental to the conduct of a low-energy seismic survey) cannot reasonably be expected to result in cumulative adverse effects that could have a substantial effect on target or non-target species.

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

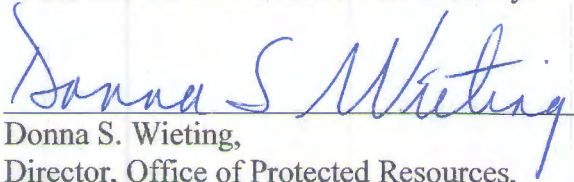
effects on target or non-target species incidentally taken by harassment due to elevated sound levels.

We have issued incidental take authorizations for other seismic research surveys (to Scripps Institution of Oceanography, Lamont-Doherty Earth Observatory of Columbia University, U.S. Geological Survey, and other agencies) that may have resulted in the harassment of marine mammals, but they are dispersed both geographically (throughout the world) and temporally, are short-term in nature, and all use mitigation and monitoring measures to minimize impacts to marine mammals. Because of the relatively short time that the project area will be ensonified (not more than 45 operational days), the action will not result in synergistic or cumulative adverse effects that could have a substantial effect on any species.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting EA titled, *Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Dumont d'Urville Sea off the Coast of East Antarctica, January to March 2014*, we have determined that issuance of an IHA to NSF and ASC in accordance with Alternative 1 the EA would not significantly impact the quality of the human environment, as described in this FONSI and in the EA.

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



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

JAN 31 2014

Date