ENVIRONMENTAL ASSESSMENT

Issuance of an Incidental Harassment Authorization to the U.S. Navy to Take Marine Mammals by Harassment Incidental to a Physical Oceanographic Survey in the Southwest Indian Ocean

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LEAD AGENCY: USDOC, National Oceanic and Atmospheric Administration
National Marine Fisheries Service, Office of Protected Resources
1315 East West Highway
Silver Spring, MD 20910

RESPONSIBLE OFFICIAL: James H. Lecky, Director, Office of Protected Resources

FOR INFORMATION CONTACT: Office of Protected Resources
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
(301) 427-8400

LOCATION: Southwest Indian Ocean

ABSTRACT: The National Marine Fisheries Service proposes to issue an Incidental Harassment Authorization to the U.S. Navy for the taking, by Level B harassment, of small numbers of marine mammals, incidental to conducting a physical oceanographic survey in the southwest Indian Ocean.

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LIST OF ACRONYMS, ABBREVIATIONS, AND INITIALISMS

ACC	Antarctic Circumpolar Current
ARC	Agulhas Return Current
BiOp	Biological Opinion
CEQ	President's Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	(U.S.) Endangered Species Act
GI	Generator-Injector
IHA	Incidental Harassment Authorization (under the U.S. MMPA)
in	inch
min	minute
MMPA	(U.S.) Marine Mammal Protection Act
NAO	NOAA Administrative Order
NEPA	(U.S.) National Environmental Policy Act
NMFS	(U.S.) National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
Nm	nautical mile
OMB	Office of Management Budget
PSO	Protected Species Observer
U.S.C.	United States Code

1. CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 DESCRIPTION OF PROPOSED ACTION

NMFS has received an application from the U.S. Naval Research Laboratory (Navy) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to conducting a 14-day physical oceanographic survey in the southwest Indian Ocean. The Navy's survey activities, which have the potential to behaviorally disturb marine mammals, warrant an incidental take authorization from the National Marine Fisheries Service (NMFS) under section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 *et seq*.).

The proposed action considered in this Environmental Assessment (EA) is NMFS' issuance of a one-year IHA under section 101(a)(5)(D) of the MMPA, for the taking, by Level B harassment only, of small numbers of marine mammals incidental to conducting a physical oceanographic survey.

This EA, titled "*Issuance of an Incidental Harassment Authorization to the U.S. Naval Research Laboratory to Take Marine Mammals by Harassment Incidental to a Physical Oceanographic Survey in the Southwest Indian Ocean*" (hereinafter, EA), addresses the impacts on the human environment that would result from issuance of this IHA for MMPA Level B takes of marine mammals during the survey, taking into account the mitigation measures required in the IHA.

1.1.1 INCORPORATION OF THE NAVY'S BIOLOGICAL ASSESSMENT BY REFERENCE

After conducting an independent review of the information and analyses for sufficiency and adequacy, NMFS incorporates by reference the Navy's Biological Assessment (NRL, 2011b). In summary, the Navy's analysis concluded that the specific mitigation, monitoring, and reporting measures built into the physical oceanographic survey are expected to effectively minimize the chance for vessel strikes, as well as reduce the potential for acoustic and other types of harassment during the project.

1.1.2 MMPA 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 section 101(a)(5)(D) of the MMPA and 7(a)(4) of the ESA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals, by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and a notice of a proposed authorization is provided to the public for review. Section 101(a)(5)(D) of the MMPA also establishes a 45-day time limit for NMFS' review of an application for an IHA followed by a 30-day public notice and comment period on any proposed authorizations for the incidental

harassment of small numbers of marine mammals. Within 45 days of the close of the public comment period, NMFS must either issue or deny the IHA.

Purpose: The primary purpose of NMFS issuing an IHA to the Navy is to provide an exemption from the take prohibitions contained in the MMPA for the take of marine mammals incidental to the Navy's physical oceanographic survey.

Need: As noted above this section, the MMPA establishes a general moratorium or prohibition on the take of marine mammals, including take by behavioral harassment. The MMPA establishes a process by which individuals engaged in specified activities within a specified geographic area may request an IHA. NMFS must authorize the take of small numbers of marine mammals if, among other things, it complies with the process described above this section, makes certain determinations, and requires the implementation of mitigation and monitoring to minimize potential adverse impacts and resulting take. Specifically, NMFS shall grant the IHA if it finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The IHA must set forth the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the mitigation, monitoring, and reporting of such takings.

The Navy has submitted a complete application demonstrating potential eligibility for issuance of an IHA. NMFS now has a corresponding duty to determine whether and how it can fashion an IHA authorizing take by harassment incidental to the activities described in the Navy's application. The need for this action is, therefore, established and framed by the MMPA and NMFS's responsibilities under section 101(a)(5)(D) of that Act, its implementing regulations, and other applicable requirements which will influence its decision making, such as section 7 of the ESA which is discussed in more detail below this section.

The foregoing purpose and need guide NMFS in developing alternatives for consideration, including alternative means of mitigating potential adverse effects.

1.2 NEPA REQUIREMENTS AND SCOPE OF NEPA ANALYSIS

This EA focuses primarily on the environmental effects of authorizing MMPA Level B incidental takes of marine mammals during a physical oceanographic survey in the southwest Indian Ocean. The MMPA and its implementing regulations governing issuance of an IHA require that upon receipt of a valid and complete application for an IHA, NMFS must publish a notice of proposed IHA in the *Federal Register* within 45 days. The notice issued for the Navy's action summarized the purpose of the requested IHA, included a statement that NMFS would prepare an EA for the proposed action, and invited interested parties to submit written comments concerning the application and NMFS' preliminary analyses and findings including those relevant to consideration in the EA.

NOAA Administrative Order 216-6 (NAO 216-6) established agency procedures for complying with the National Environmental Policy Act (NEPA) and the implementing regulations issued by the President's Council on Environmental Quality (CEQ). Consistent with the intent of NEPA

and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, NMFS requested comments on the potential environmental impacts described in the Navy's application and the proposed IHA. Comments received on the proposed IHA were considered during preparation of this EA.

Under NAO 216-6, the proposed issuance of authorization for incidental take of marine mammals is an action that is not categorically excluded from NEPA review. In addition, it is not the type of action normally requiring preparation of an Environmental Impact Statement (EIS). Therefore, NMFS has prepared this EA to assist in determining whether the direct, indirect, and cumulative impacts related to its issuance of the authorization for incidental take under the MMPA of thirty marine mammal species are likely to result in significant impacts to the human environment, or whether the analysis contained herein, including documents referenced and incorporated by reference and public comments received on the proposed IHA, supports the issuance of a Finding of No Significant Impact. Given the limited scope of the decision for which NMFS is responsible (i.e. whether or not to issue the authorization including prescribed means of take, mitigation measures, and monitoring requirements) and that this EA is intended to inform, the scope of analysis is limited to evaluating and disclosing the impacts to living marine resources and their habitat likely to be affected by issuance of an IHA authorizing the take of marine mammals incidental to the Navy's physical oceanographic survey. As described more fully below this section, the EA identifies all marine mammals, and species protected under the ESA, that are likely to occur within the action area.

The analysis focuses on the impacts to certain marine mammal species that could potentially result from issuance of the IHA for the take of marine mammals incidental to the proposed physical oceanographic survey in the southwest Indian Ocean; impacts that would result from the alternatives presented; and the consideration of potential cumulative environmental impacts. Impacts to other marine species and habitat located in the action area were considered unlikely, and thus received less detailed evaluation.

The need for this EA is to provide a NEPA analysis informing the decision of whether or not to issue the IHA to the Navy and to determine whether the proposed action has any potential significant impacts. NOAA has relied on and incorporated the environmental analysis prepared by the Navy in their Biological Assessment addressing the direct, indirect, and cumulative impacts of the underlying activities associated with the survey described in the application and its supporting documents.

1.2.1 NEPA Scoping Summary

The purpose of scoping is to identify the issues to be addressed and any potentially significant environmental issues related to the proposed action, as well as identify and eliminate from detailed study the environmental issues that are not significant or that have been covered by review in prior NEPA analyses. An additional purpose of the scoping process is to identify the concerns of the affected public and federal agencies, states, and Indian tribes.

Under 50 CFR 216.104(b) of NMFS' implementing regulations for the MMPA, NMFS must, after deeming the application adequate and complete, publish in the *Federal Register* a notice of proposed IHA or receipt of a request for the implementation or re-implementation of

regulations governing the incidental taking. Information gathered during the associated comment period is considered by NMFS in ensuring adequacy of preliminary determinations and proposed mitigation measures for IHAs. In accordance, a notice of proposed IHA was published in the *Federal Register* on November 21, 2011 (76 FR 71940) and was made available for public review and comment for 30 days. Comments received on the proposed IHA were used to develop the scope of this EA.

1.2.2 PUBLIC INVOLVEMENT

On November 21, 2011, NMFS published a notice of a proposed IHA in the *Federal Register* (76 FR 71940) and requested comments from the public for 30 days. NMFS received comments from the Marine Mammal Commission and one individual.

Neither comment letter addressed issues related specifically to the NEPA process for this action. NMFS has developed responses to the specific comments regarding issuance of an IHA under the MMPA and will provide those responses in the *Federal Register* notice announcing the issuance of the IHA. NMFS does not repeat those responses here. NMFS notes, however, that it fully considered all comments, particularly those related to mitigation and monitoring. NMFS determined, based on the best available data, that the proposed measures are presently the most feasible and effective measures capable of implementation by the Navy during the proposed survey.

1.3 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action.

1.3.1 THE NATIONAL ENVIRONMENTAL POLICY ACT

NEPA's EIS requirement is applicable to 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. NMFS' issuance of an IHA for incidental harassment of marine mammals represents approval and regulation of takes of marine mammals incidental to the applicant's activities and is a federal action for which environmental review is required. While NEPA does not dictate a substantive outcome for an IHA, it requires consideration of environmental issues in federal agency planning and decision making, and requires an analysis of alternatives and direct, indirect, and cumulative environmental effects of the NMFS proposed action to authorize MMPA Level B incidental take. As noted, NMFS has prepared this EA to assist in determining whether an EIS is necessary for the action.

1.3.2 THE ENDANGERED SPECIES ACT

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or critical habitat. NMFS' issuance of an IHA affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these section 7 consultation requirements. Accordingly, NMFS is required to ensure that its action is not likely to jeopardize the continued existence of any threatened or endangered species or result in

destruction or adverse modification of critical habitat for such species. Regulations specify the requirements for these consultations (50 CFR § 402).

The Navy initiated section 7 consultation with NMFS on August 15, 2011 and NMFS also consulted internally. NMFS completed formal section 7 consultation and prepared a Biological Opinion (BiOp) concluding that the project may adversely affect marine mammal species, but is not likely to jeopardize the continued existence of these species (NMFS, 2012). With respect to sea turtles, the BiOp concluded that the project may adversely affect, but is not likely to jeopardize the continued existence of any species of sea turtle.

1.3.3 THE MARINE MAMMAL PROTECTION ACT

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce to authorize, upon request, the incidental, but not intentional, taking by harassment of small numbers of marine mammals of a species or population stock, for periods of not more than one year, by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specific geographic region if certain findings are made and a *Federal Register* notice of a proposed authorization is provided to the public for review.

Section 101(a)(5)(D) of the MMPA established an expedited process by which U.S. citizens can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as:

> any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [“Level A harassment”]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [“Level B harassment”].

Section 101(a)(5)(D) of the MMPA establishes a 45-day time limit for NMFS’ review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of small numbers of marine mammals. Not later than 45 days after the close of the public comment period, if the Secretary of Commerce makes the findings set forth in section 101(a)(5)(D)(i) of the MMPA, the Secretary of Commerce shall issue the authorization with appropriate conditions to meet the requirements of section 101(a)(5)(D)(ii) of the MMPA.

NMFS has promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 216) and has 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.

2. CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

The NEPA implementing regulations (40 CFR § 1502.14) and NAO 216-6 provide guidance on the consideration of alternatives to a federal proposed action and require rigorous exploration and objective evaluation of all reasonable alternatives. Each alternative must be feasible and reasonable in accordance with the President's CEQ regulations (40 CFR §§ 1500-1508). This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated purpose and need, as well as alternatives eliminated from detailed study and also summarizes the expected outputs and any related mitigation for each alternative.

This EA evaluates the alternatives to ensure that they would fulfill the purpose and need, namely: (1) the issuance of an IHA for the take of marine mammals by Level B behavioral harassment, incidental to the Navy's physical oceanographic survey in the southwest Indian Ocean; and (2) compliance with the MMPA which sets forth specific standards (i.e., no unmitigable adverse impact and negligible impact) that must be met in order for NMFS to issue an IHA.

NMFS' proposed action (preferred) alternative represents the activities proposed by the applicant for the IHA, along with required monitoring and mitigation measures that would minimize potential adverse environmental impacts.

Under the requirements of the MMPA, if the proposed action will have no more than a negligible impact on the species or stocks, and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses, then NMFS shall issue the IHA. As described earlier, NMFS must set forth the permissible methods of taking by harassment and requirements pertaining to the mitigation, monitoring, and reporting of such taking.

2.1 PROJECT OBJECTIVES

The fundamental objective of the project is to study the mixing of ocean waters with different characteristics to better understand the relationship between ocean mixing and climate change, and acquire better data to improve ocean circulation and climate modeling. This will be accomplished by measuring how sound moves and disperses through areas where water bodies of different physical and chemical characteristics meet.

2.2 ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under the No Action Alternative, NMFS would not issue an IHA to the Navy for the taking, by Level B harassment, of small numbers of marine mammals, incidental to conducting a physical oceanographic survey in the southwest Indian Ocean. The MMPA prohibits all takings of marine mammals unless authorized by a permit or exemption under the MMPA. The consequences of not authorizing incidental take are (1) the entity conducting the activity may be in violation of the MMPA if take occurs, (2) mitigation and monitoring measures cannot be required by NMFS, and (3) mitigation measures might not be performed voluntarily by the applicant. By undertaking measures to further protect marine mammals from incidental take through the authorization program, the impacts of these activities on the marine environment can potentially be lessened. While NMFS does not authorize the survey itself, NMFS does authorize the incidental harassment of marine mammals in connection with this activity and prescribes the

methods of taking and other means of effecting the least practicable adverse impact on the species and stocks and their habitats. If an IHA was not issued, the Navy could decide either to cancel its survey or to continue the proposed activity. If the latter decision was made, the Navy could independently implement mitigation measures; however, they would be proceeding without authorization from NMFS pursuant to the MMPA. If the Navy did not implement mitigation measures during survey activities, takes of marine mammals by harassment (and potentially by injury or mortality) could occur if the activities were conducted when marine mammals were present. Although the No Action Alternative would not meet the purpose and need to allow incidental takings of marine mammals under certain conditions, CEQ regulations require consideration and analysis of a No Action Alternative for the purposes of presenting a comparative analysis to the action alternatives.

2.3 ALTERNATIVE 2 – PROPOSED ACTION (PREFERRED)

The Proposed Action is the Preferred Alternative. Under this alternative, NMFS would issue an IHA to the Navy allowing the take, by Level B harassment, of thirty marine mammal species in the southwest Indian Ocean, incidental to a physical oceanographic survey with the mitigation, monitoring, and reporting conditions contained within the Navy's IHA application and NMFS' proposed IHA *Federal Register* notice (76 FR 71940, November 21, 2011). Accordingly, this NEPA Preferred Alternative (Proposed Action) would satisfy the purpose and need of the NMFS MMPA action – issuance of an IHA, along with required mitigation and monitoring measures – and would enable the Navy to comply with the statutory and regulatory requirements of the MMPA.

2.3.1 SURVEY OPERATIONS

The NMFS' proposed IHA *Federal Register* notice (76 FR 71940, November 21, 2011) describes the survey protocols in detail and this EA briefly summarizes them here. Research activities would be conducted from the RV *Melville* for a total of 17 days. Seismic surveys would be conducted for 14 of those days in the area of the Agulhas Plateau and the remaining 3 days would be used for mooring deployments and recoveries, other sampling methods, and transit to and from Cape Town, South Africa. Seismic operations would be conducted using a towed array of two low-energy 105 in^3 generator injector air guns (GI-guns). Data collection would also utilize acoustic Doppler current profilers, a multibeam echosounder, and sub-bottom profiler. Seismic studies would encompass a total linear distance of about 2,489 kilometer, and be comprised of multiple transects across and along the Agulhas Return Current/Antarctic Circumpolar Current (ARC/ACC) front.

2.3.2 MITIGATION AND MONITORING MEASURES

The NMFS' proposed IHA *Federal Register* notice (76 FR 71940, November 21, 2011) describes the required mitigation and monitoring measures in detail and this EA briefly summarizes them here. To reduce the potential for disturbance from acoustic stimuli associated with the activities, the Navy has proposed to implement the following mitigation and monitoring measures for marine mammals: (1) 70-m exclusion zone; (2) speed or course alteration; (3) shut down and delay procedures; (4) ramp-up procedures; and (5) visual monitoring.

Proposed Exclusion Zones: NMFS has determined that for acoustic effects, using acoustic thresholds in combination with corresponding exclusion zones is an effective way to consistently apply measures to avoid or minimize the impacts of an action. The Navy would establish a 70-m radius exclusion zone around the survey vessel during airgun operation. The purpose of the exclusion zone is to prevent marine mammals from being exposed to a certain level of sound. In this case, the Navy used the exposure threshold isopleths applicable to marine mammals, as well as extant models of same/similar GI-gun sources and water depths, as the basis for their 180-dB exclusion zone.

Speed or Course Alteration: If a marine mammal is observed moving on a path toward an exclusion zone, the Navy will attempt to adjust the vessel speed or course in order to minimize the likelihood of an animal entering an exclusion zone.

Shut Down and Delay Procedures: The Navy would shut down or delay survey activities if a marine mammal is seen within or approaching the exclusion zone. Airgun activity would not resume until the marine mammal moves out of the exclusion zone or has not been resighted for 15 minutes (min) (dolphins) to 30 min (whales).

Ramp-up Procedures: The Navy would implement ramp-up procedures at the beginning of survey activity to allow marine mammals to leave the immediate area before sound sources reach full energy. Ramp-up would be comprised of gradually activating the dual GI-guns in sequence over a period of about 30 min until the desired operating level is reached. This should allow any marine mammals in the area to avoid the maximum sound source. Airguns would be activated in a sequence such that the source level of the array would increase in steps not exceeding 6 dB per 5-min periods over a total duration of 30 min. During ramp-up, protected species observers (PSOs) would monitor the exclusion zones for marine mammals and a shutdown would be implemented if an animal is detected in or approaching an exclusion zone.

Visual Monitoring: The Navy would continuously monitor the harassment isopleths during daytime and nighttime airgun operations. Vessel-based visual monitoring would be comprised of three PSOs typically working in shifts of 4-hour durations or less. A PSO platform is located one deck below and forward of the bridge (12.5 m above the waterline), providing a relatively unobstructed 180 degree view forward. Aft views can be obtained along both the port and starboard decks. During daytime operations, PSOs would systematically survey the area around the vessel with reticle and big-eye binoculars and the naked eye. A clinometer would be used to determine distances of animals in close proximity to the vessel, and hand-held fixed rangefinders and distance marks on the *Melville's* side rails would be used to measure the exact location of the exclusion zones. During nighttime operations, night vision devices would be available if required. PSOs would be in wireless communication with the ship's officers on the bridge and scientists in the vessel's operations laboratory, so they can promptly advise of the need for avoidance maneuvers or seismic source shutdown.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

NFMS considered whether other alternatives could meet the purpose and need and support the Navy's proposed activity. An alternative that would allow for the issuance of an IHA with no required mitigation or monitoring was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, this alternative is not analyzed further in this document.

NMFS also considered an alternative whereby NMFS issues the IHA for another time. However, this alternative failed to meet the statutory and regulatory requirements of the MMPA for an IHA as the Navy did not submit an application (i.e., NMFS shall issue an IHA upon request) to conduct the survey at an alternate time. Conducting research in the austral summer months is optimal for human health and safety, and at a time when marine mammal population densities in the area are at their annual low. The potential environmental impacts of conducting the survey at a different time may be greater than the impacts of the proposed action.

3. CHAPTER 3 – AFFECTED ENVIRONMENT

The summary of the physical and biological environment of the study area, as analyzed in the IHA application, notice of proposed IHA, and Biological Assessment is hereby incorporated by reference (NRL, 2011b; 76 FR 71940, November 21, 2011; NRL, 2011a).

In addition to the marine mammal stocks and species that are the subject of the IHA, a number of sea birds, sea turtles, fish, and invertebrates may be found in the action area. Sections 3.2.2 through 3.2.5 of the EA briefly summarize them.

3.1 PHYSICAL ENVIRONMENT

3.1.1 BATHYMETRY AND OCEANOGRAPHY

The survey would encompass the pelagic waters in the area of the Agulhas Plateau. The exact location of the ARC/ACC front in January 2012 cannot be predetermined due to the natural meander of these oceanographic features. However, the frontal system is expected to be phase locked at about 36ºS to 40ºS and 21ºE to 27ºE. The total area in which activities could occur is about 207,500 Nautical miles^2 (Nm) and about 150-600 Nm due south of the South African coast. Waters in this region range from about 1,000-5,200 meters in depth.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 MARINE MAMMALS

Thirty-nine species of endemic or migratory cetacean are known to inhabit waters between South Africa and Antarctica, including 31 odontocetes (toothed cetaceans), seven mysticetes (baleen whales), and one pinniped. Among these, the southern right, humpback, sei, fin, blue, and sperm are listed as endangered under the ESA.

The species of marine mammals that could be commonly encountered in the survey area include the following: Antarctic minke whale (*Balaenoptera bonaerensis*), Bryde's whale (*Balaenoptera edeni*), common minke whale (*Balaenoptera acutorostrata*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), Arnoux's beaked whale (*Berardius arnuxii*), Cuvier's beaked whale (*Ziphius cavirostris*), Gray's beaked whale (*Mesoplodon grayi*), Hector's beaked whale (*Mesoplodon hectori*), southern bottlenose whale (*Hyperoodon planifrons*), southern right whale (*Eubalaena australis*), sperm whale (*Physeter macrocephalus*), strap-toothed whale (*Mesoplodon layardii*), True's beaked whale (*Mesoplodon mirus*), common bottlenose dolphin (*Tursiops truncatus*), false killer whale (*Pseudorca crassidens*), hourglass dolphin (*Lagenorhynchus cruciger*), killer whale (*Orcinus orca*), long-beaked common dolphin (*Delphinus capensis*), long-finned pilot whale (*Globicephala melas*), pantropical spotted dolphin (*Stenella attenuata*), pygmy killer whale (*Feresa attenuata*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), short-beaked common dolphin (*Delphinus delphis*), short-finned pilot whale (*Globicephala macrorhynchus*), southern right whale dolphin (*Lissodelphis peronii*), spinner dolphin (*Stenella longirostris*), and striped dolphin (*Stenella coeruleoalba*). More information about each stock may be

found in the respective Stock Assessment Reports, which are available online at http://www.nmfs.noaa.gov/pr/sars/species.htm.

3.2.2 SEABIRDS

South Africa is home to a variety of sea birds, among them, gulls, gannets, terns, pelicans, and cormorants. The African penguin is endemic to the area and nests on inaccessible offshore islands with one or two colonies near Cape Town and Robben Island.

3.2.3 MARINE TURTLES

Four species of marine turtles have the potential to occur in the area during the proposed survey activities. They include the green (*Chelonia mydas*); leatherback (*Dermochelys coriacea*); loggerhead (*Caretta caretta*); and hawksbill (*Eretmochelys imbricata*) sea turtles. All four species are listed as threatened or endangered under the ESA. Both the leatherback and loggerhead have known nesting grounds along the South African coast. More information about each species can be found online at http://www.nmfs.noaa.gov/pr/species/turtles/.

3.2.4 FISH

Of the more than 2,000 marine fish species in the waters off the South African coast, no species are listed as threatened or endangered under the ESA.

3.2.5 INVERTEBRATES

Numerous crustaceans, cephalopods, and plankton species may be found in the proposed action area.

4. CHAPTER 4 –ENVIRONMENTAL CONSEQUENCES

The Navy's application, the Navy's Biological Assessment, NMFS' notice of proposed IHA, and the BiOp, which together address potential direct, indirect, and cumulative impacts of the proposed marine seismic survey on marine mammals, sea turtles, fish, and invertebrates, and impacts to prey species and marine mammal habitats, are hereby incorporated by reference (NRL, 2011b; NRL, 2011a; 76 FR 71940, November 21, 2011; NMFS, 2012).

NMFS has evaluated the potential impacts of the Navy's action in order to determine whether to authorize incidental take of marine mammals under the MMPA. NMFS has determined that an EA is appropriate to evaluate the potential significance of environmental impacts to the marine environment resulting from issuance of this IHA. NMFS expects that marine mammals may be present throughout the study area.

NMFS' evaluation indicates that any direct or indirect effects of the action would not result in a substantial impact to living marine resources or their habitats and would not have any adverse impacts on biodiversity or ecosystem function. Effects of the proposed action are considered to be short-term, temporary in nature, and negligible, and unlikely to affect normal ecosystem function or predator/prey relationships; therefore, there would not be a substantial impact on marine life biodiversity or on the normal function of the near shore or offshore marine environment. NMFS has determined that appropriate mitigation measures would be in place to minimize impacts to marine mammals and other marine species.

The Navy proposes to conduct the physical oceanographic survey for about 17 days during the austral summer. As the vessel transits the area while conducting the survey, any displacement of marine fish species by the proposed action would be temporary. Many fish species (i.e., those that do not have swim bladders, have rudimentary swim bladders (such as bottom-dwelling species, including flatfish), or well-developed swim bladders that are not directly connected to the ears) tend to have relatively poor auditory sensitivity and are not likely to be affected by exposure to intense noise. The survey may potentially displace prey items of marine mammals, such as fish. However, prey items would return after the vessel has transited through the area and the ambient sound has returned to baseline levels.

The overall response of fishes is to exhibit startle responses and undergo vertical and horizontal movements away from the sound source. NMFS expects that the survey would have no more than a temporary and minimal adverse effect on any fish or invertebrate species and no cumulative effects on the environment. Although there is a potential for injury to fish or marine life in close proximity to the vessel, the impacts of the survey on fish and other marine life specifically related to acoustic activities are expected to be temporary in nature, negligible, and would not result in substantial impact to these species or to their role in the ecosystem.

The Navy's physical oceanographic survey is not expected to substantially impact benthic and invertebrate communities in the study area. The existing body of information on the impacts of

seismic survey sound on marine invertebrates and benthic fauna is very limited. Recent controlled field experiments[1] on adult crustaceans exposed to seismic energy found no pathological impacts to the research animals. The study reported that the seismic survey did not: (1) cause any acute or mid-term mortality of the crab; (2) alter feeding behavior; or (3) affect embryo survival or post-hatch locomotion of larvae.

The impacts of the survey on marine mammals and sea turtles are specifically related to acoustic activities, and these are expected to be temporary in nature, negligible in intensity, and would not result in substantial impacts to marine mammals, sea turtles, or to their role in the ecosystem. These temporary acoustic activities would not affect physical habitat features, such as substrates and water quality. Additionally, the effects from vessel transit would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitats. While the potential for striking marine mammals and sea turtles is a valid concern, the likelihood of a survey vessel striking a marine mammal is considered low due to low marine mammal densities in the proposed action area during austral summer months and the use of a single vessel. During survey operations, the *Melville* would travel at considerably slow speeds of 4-6 knots.

NMFS anticipates, and would authorize, the incidental Level B harassment only of small numbers of marine mammals, in the form of temporary behavioral disturbance. NMFS does not anticipate that take by injury (Level A harassment), serious injury, or mortality would occur and expects that harassment takes would be at the lowest level practicable due to the incorporation of the mitigation measures required by the proposed IHA and analyzed in this EA. Level B harassment is not expected to affect biodiversity or ecosystem function. As with marine mammals, sea turtles may at worst experience temporary hearing threshold shifts and may exhibit relatively minor and short-term behavioral responses.

4.1 EFFECTS OF ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under the No Action Alternative, NMFS would not issue an IHA to the Navy for the proposed physical oceanographic survey. In this case, the Navy would decide whether or not it would want to continue with survey activities. If the Navy chose not to conduct the activity, then there would be no effects to marine mammals. Conducting the activity without an MMPA authorization (i.e., an IHA) could result in a violation of federal law. If the Navy decided to conduct some or all of the activity without implementing any mitigation measures, and if activities occur when marine mammals are present in the action area, there is the potential for unauthorized harassment of marine mammals. The sounds produced by seismic operations would have the potential to cause behavioral harassment of marine mammals in the action area, while some marine mammals may avoid the area altogether. Additionally, masking of natural sounds may occur. Auditory impacts (i.e., temporary and permanent threshold shifts) could also occur if no mitigation or monitoring measures are implemented. Monitoring of exclusion zones

[1] Christian, J.R., A. Mathieu, D.H. Thomson, D. White, and R.A. Buchanan. 2003. Effect of seismic energy on snow crab (*Chionoecetes opilio*). Environmental Studies Research Funds Report No. 144. Calgary, AB, Canada. November.

for the presence of marine mammals allows for the implementation of mitigation measures, such as power-downs and shutdowns when marine mammals occur within these zones. These measures are required to prevent the onset of shifts in hearing thresholds. However, if a marine mammal occurs within these high energy ensonified zones, it is possible that hearing impairments to marine mammals could occur. Additionally, although unlikely, based on an animal's proximity to the sound source, permanent threshold shift (PTS) could also occur, but this possibility is thought to be unlikely. If the Navy were to decide to implement mitigation measures similar to those described in the proposed IHA, then the impacts would most likely be similar to those described for Alternative 2 below.

4.2 EFFECTS OF ALTERNATIVE 2 – PREFERRED ALTERNATIVE

The Navy's application, Biological Assessment, and proposed IHA *Federal Register* notice, incorporated by reference (NRL, 2011b; NRL, 2011a; 76 FR 71940, November 21, 2011), describe, in detail, the potential effects of seismic operations on marine mammals. The Navy's application also includes discussion of effects on fish and invertebrates. As for sea turtles, their auditory sensitivity is in the low frequency range (below about 1.5 kilohertz). The output frequencies of the acoustic equipment that would be used during the survey exceed the auditory capabilities of sea turtles. Thus, there is a very low probability that sea turtles would experience any exposure to these sound sources.

Potential adverse effects on sea birds are displacement and disruption of feeding, disruption of abundance and behavior of prey species, disturbance to breeding birds and eggs, nestling mortality, and accidental injury or mortality. None of these types of adverse effects are considered likely outcomes of the proposed research. Any disruption to feeding through displacement from a feeding area would be transient and short-lived as the vessel would traverse a large area of ocean at about 4 knots, with no overlap of the areas transited. Prey species for birds would not be affected by seismic operations to a degree such that foraging would be significantly impacted. The potential for disturbance of breeding birds is considered negligible given the research activities would be conducted at sea, a minimum of 150 Nm from the South African coast. As such, no impacts to eggs, nestlings, or breeding areas are expected. Several seabird species forage by diving to depths of several meters or more (e.g., terns, pelicans, and cormorants), so a foraging seabird could potentially dive in close proximity to the GI-gun array such that it would result in injury or mortality. However, information on such circumstances is not available. In general, seabirds are not known to exhibit any behavioral disturbance in response to seismic surveys. The only effect considered possible as a result of the proposed research activities is localized and temporary displacement of birds from an area of foraging. Such displacement would be so transient, and encompass such a small percentage of foraging area, that it is considered of no significance to the foraging of seabirds.

The Navy proposed a number of monitoring and mitigation measures for marine mammals, which were included in the proposed IHA *Federal Register* notice (76 FR 71940, November 21, 2011). In analyzing the effects of the preferred alternative, NMFS has considered the following monitoring and mitigation measures as part of the preferred alternative:

(1) exclusion zones;
(2) speed or course alteration;

(3) shut-down and delay procedures;
(4) ramp-up procedures; and
(5) visual monitoring by PSOs.

Inclusion of these monitoring and mitigation measures is anticipated to minimize and/or avoid impacts to marine resources. With the above planned monitoring and mitigation measures, any unavoidable impacts to a marine mammal or sea turtle encountered are expected to be limited to short-term, localized changes in behavior (such as brief masking of natural sounds) and short-term changes in animal distribution near the survey vessel. At worst, effects on marine mammals may be interpreted as falling within the MMPA definition of "Level B behavioral harassment." The Navy's proposed 70-m exclusion zone covers the Level A (180 dB) harassment isopleth, minimizing the potential for injury or mortality. Under the proposed action, NMFS expects no long-term or substantial adverse effects on marine mammals, marine turtles, seabirds, fish, invertebrates, or the populations to which they belong or on their habitats.

NMFS does not anticipate that take by injury (Level A harassment), serious injury, or mortality would occur and expects that harassment takes would be at the lowest level practicable due to the incorporation of the mitigation measures proposed in the application and NMFS' notice of proposed IHA (76 FR 71940, November 21, 2011), nor is take by injury, serious injury, or mortality authorized by the proposed IHA.

4.2.1 COMPLIANCE WITH NECESSARY LAWS – NECESSARY FEDERAL PERMITS

NMFS has determined that the IHA is consistent with the applicable requirements of the MMPA, ESA, and NMFS' implementing regulations. The applicant has secured or applied for necessary permits from NMFS. The applicant is responsible for complying with all other applicable laws and regulations.

4.2.2 UNAVOIDABLE ADVERSE IMPACTS

The summary of unavoidable adverse impacts to marine mammals, marine turtles, seabirds, fish, invertebrates, the populations to which they belong, and on their habitats occurring in the survey area was analyzed previously and is hereby incorporated by reference (NRL, 2011a; NRL, 2011b).

NMFS does not expect the Navy's activities to have adverse consequences on the viability of marine mammals in the study area. Further, NMFS does not expect that marine mammal populations in the survey area would 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 physical oceanographic survey would have a negligible impact on the affected species or stocks of marine mammals. The MMPA requirement of ensuring the proposed action has no unmitigable adverse impact to subsistence uses does not apply here because of the location of the proposed activity.

4.3 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 may occur when there is a relationship between a proposed action and other actions expected to occur in a similar location or during a similar time period, or when past or future actions may result in impacts that would additively or synergistically affect a resource of concern. These relationships may or may not be obvious. Actions overlapping within close proximity to the proposed action can reasonably be expected to have more potential for cumulative effects on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide temporally will tend to offer a higher potential for cumulative effects.

Actions that might permanently remove a resource would be expected to have a potential to act additively or synergistically if they affected the same population, even if the effects were separated geographically or temporally. Note that the proposed action considered here would not be expected to result in the removal of individual cetaceans or pinnipeds from the population or to result in harassment levels that might cause animals to permanently abandon preferred feeding areas or other habitat locations, so concerns related to removal of viable members of the populations are not implicated by the proposed action. This cumulative effects analysis considers these potential impacts, but more appropriately focuses on those activities that may temporally or geographically overlap with the proposed activity such that repeat harassment effects warrant consideration for potential cumulative impacts to the affected thirty marine mammal species and their habitats.

Human activities in the region of the proposed survey in the southwest Indian Ocean include commercial and recreational vessel traffic, fishing, and marine tourism. The adverse effects of climate change, vessel-strikes, fisheries interactions, poaching and harvesting, bioaccumulation of environmental contaminants, introduction of anthropogenic sound into the marine environment, natural disease and predation, as well as hazards posed by marine pollution, will undoubtedly continue into the foreseeable future. Of these adverse impacts and threats, the only additive impact from the Navy's survey would be that of introduced sound into the marine environment via operation of the acoustic equipment described. Where the addition to ambient ocean background noise would occur as a result of conducting research activities, the contribution of the research activities to extant ocean noise is expected to be minor, and of minimal impact on the marine environment. Research activities would be conducted well out to sea, greater than 150 Nm from shore, and removed from high traffic areas (fisheries and commercial shipping), the majority of which is typically within 100 Nm of the coast. Vessel traffic, both commercial and recreational, is virtually always present in the proposed action area and the potential exists for the *Melville* to strike a marine mammal. However, considering the low marine mammal densities in the area, the use of a single vessel, relatively low vessel speed, and the proposed monitoring and mitigation measures, NMFS does not expect the proposed action to result in collision of the *Melville* with any marine mammal. Therefore, no contribution to the extant environmental baseline for vessel strike is expected. The Navy's proposed physical oceanographic survey is not expected to add significantly to the impacts from past, present, and reasonably foreseeable future activities on the surrounding habitat, physical oceanographic conditions, benthic fauna and shellfish, fish resources, sea turtles, marine mammals, seabirds,

water quality, visual impacts, cultural resources, recreational or commercial resources, climate, socioeconomics, etc.

NMFS has issued incidental take authorizations for other seismic surveys throughout the world, but the surveys are dispersed both geographically and temporally, are short-term in nature, and all of the authorization holders would be required to use mitigation and monitoring measures to minimize impacts to marine mammals and other living marine resources in the activity area. There are no other seismic surveys scheduled for the southwest Indian Ocean in 2012 and therefore, NMFS is 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. NMFS has also issued (and is in the process of issuing) numerous scientific research permits that allow for the harassment of marine mammals and sea turtles. However, these permits typically cover large bodies of water (e.g., Atlantic Ocean) and are not specific to the ARC/ACC front area.

NMFS' proposed action of issuing an IHA for the incidental take of marine mammals by Level B harassment in the southwest Indian Ocean is only expected to result in minimal impacts to marine species in the area. This limited action and any temporary, behavioral effects that may result from the Navy's physical oceanographic survey, are not expected to contribute substantially to other cumulative impacts.

4.4 CONCLUSION

The inclusion of the mitigation and monitoring requirements in the IHA, as described in the Preferred Alternative, would ensure that the Navy's activity and the proposed mitigation measures under Alternative 2 (Preferred Alternative) are sufficient to minimize any potential adverse impacts to the human environment, particularly marine mammal species or stocks and their habitat. With the inclusion of the required mitigation and monitoring requirements, NMFS has determined that the proposed physical oceanographic survey, and NMFS' proposed issuance of an IHA to the Navy, would result at worst in a temporary modification of behavior (Level B harassment) of some individuals of thirty species of marine mammals. In addition, no take by injury, serious injury, and/or mortality is anticipated, and the potential for temporary or permanent hearing impairment would be avoided through the incorporation of the mitigation and monitoring measures described earlier in this document.

5. LIST OF PREPARERS AND AGENCIES CONSULTED

Agencies Consulted
No other persons or agencies were consulted in preparation of this EA.

Prepared By
Michelle Magliocca
Fishery Biologist
Permits and Conservation Division
Office of Protected Resources, NOAA/National Marine Fisheries Service

6. REFERENCES

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