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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648- XA871

Takes of Marine Mammals Incidental to Specified Activities; Physical Oceanographic Studies in the Southwest Indian Ocean, January through February, 2012

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA), notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to the United States Navy (Navy) to take marine mammals, by harassment, incidental to conducting physical oceanographic studies in the southwest Indian Ocean.

DATES: Effective January 23, 2012, through March 7, 2012.

ADDRESSES: A copy of the IHA and application are available by writing to P. Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910.

An electronic copy of the application containing a list of references used in this document may be obtained by writing to the above address, telephoning the contact listed here (see FOR FURTHER INFORMATION CONTACT), or visiting the internet at:

<http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>. NMFS wrote an

Environmental Assessment (EA) and prepared a Finding of No Significant Impact (FONSI),

which are available at the same internet address. Documents cited in this notice may be viewed,

by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Michelle Magliocca, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.) directs the Secretary of Commerce 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 certain findings are made and, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for the incidental taking of small numbers of marine mammals shall be granted if NMFS 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 authorization 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. NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine

mammals by 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. Within 45 days of the close of the public comment period, NMFS must either issue or deny the authorization.

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].

Summary of Request

NMFS received an application on August 15, 2011, from the United States Navy (Navy) for the taking of marine mammals, by Level B harassment, incidental to conducting physical oceanographic studies in the southwest Indian Ocean. Upon receipt of additional information, NMFS determined the application complete and adequate on September 14, 2011.

The Navy plans to use one source vessel, the R/V Melville (Melville), and a seismic airgun array to obtain high resolution imaging of ocean mixing dynamics at the Agulhas Return Current and Antarctic Circumpolar Currents (ARC/ACC) in a research project titled ARC12. The Melville will spend 14 days on seismic oceanography surveys and three days on acoustic Doppler current profiler (ADCP) mooring deployments and recoveries, other oceanographic sampling methods, and transit to and from the study site.

Acoustic stimuli (i.e., increased underwater sound) generated during the operation of the airgun array has the potential to cause short-term behavioral disturbance for marine mammals in

the survey area. This is the principal means of marine mammal taking associated with these activities, and the Navy has requested an authorization to take 30 species of marine mammals by Level B harassment. NMFS does not expect the use of the multibeam echosounder (MBES), subbottom profiler (SBP), or ADCPs to result in any take that has not already been considered in the discussion of the airguns, which will operate 24 hours per day. Take is also not expected to result from collision with the Melville because it is a single vessel moving at relatively slow speeds during seismic acquisition within the survey, for a relatively short period of time.

Description of the Specified Activity

The Navy's physical oceanographic studies are scheduled to commence on January 23, 2012, and continue for approximately 17 days ending on February 8, 2012. Some deviation from this timeline is possible due to logistics and weather conditions. NMFS is issuing an authorization that extends from January 23, 2012, through March 7, 2012.

Within this time period, the Navy will conduct seismic oceanography surveys using a towed array of two low-energy 105 in³ generator-injector (GI) airguns. The Melville is scheduled to depart from Cape Town, South Africa, on January 23, 2012, and transit to the survey area near the Agulhas Plateau, off the southern tip of Africa. The exact location of the ARC/ACC front in January cannot be predetermined due to the natural meander of the currents, but studies will most likely take place within the boundaries of 36°S to 43°S and 19°E to 30°E. The exact locations of the ARC/ACC frontal system will be determined on site using high-resolution conductivity-temperature-depth measurements. The total area of this region is about 207,500 nautical miles² (Nm²) (713,000 kilometers² [km²]). The proposed study will take place in water depths of approximately 1,000 to 5,200 meters (m). The survey will require approximately 17 days to complete approximately 2,489 km of transect lines, and be comprised of multiple transects

across and along the ARC/ACC front.

Vessel Specifications

The Melville, owned by the Navy, is a seismic research vessel with a propulsion system designed to be as quiet as possible to avoid interference with the seismic signals emanating from the airgun array. The vessel, which has a length of 97 m (318 feet [ft]); a beam of 14 m (46 ft); and a maximum draft of 5 m (16 ft); is powered by two 1,385 horsepower (hp) Propulsion General Electric motors and a 900 hp retracting bow thruster. The Melville's operation speed during seismic acquisition will be approximately 7 to 11 km/hour (hr) (4 to 6 knots) and the cruising speed of the vessel outside of seismic operations will be about 20 km/hr (11 knots). The vessel also has a platform one deck below and forward of the bridge, which is positioned 12.5 m (41 ft) above the waterline and provides a relatively unobstructed 180 degree view forward. Aft views can be obtained along both the port and starboard decks.

Acoustic Source Specifications

Metrics Used in This Document

This section includes a brief explanation of the sound measurements frequently used in the discussions of acoustic effects in this document. 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). Rms, 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 rms unless otherwise noted. SPL does not take the duration of a sound into account.

Seismic Airguns

The Melville will deploy two GI guns, which are stainless steel cylinders charged with high pressure air that, when instantaneously released into the water column, generate sound. The GI guns will operate in harmonic mode (105 in³ in each of the generator and injector chambers for a total discharge volume of 210 in³) with a 1,200 m long hydrophone streamer. GI guns will be energized simultaneously at 2,000 psi every 17 seconds (s). The GI gun array will emit sound at a frequency range of 10 to 188 Hertz (Hz) and reach a peak source level of 240 dB re 1 μ Pa. Seismic oceanography studies will be conducted 24 hours (hrs) per day for 14 days (336 hrs) and the GI guns will be towed at a depth of 3 to 9 m.

Characteristics of the Airgun Pulses

Airguns function by venting high-pressure air into the water which creates an air bubble. The pressure signature of an individual airgun consists of a sharp rise and then fall in pressure, followed by several positive and negative pressure excursions caused by the oscillation of the resulting air bubble. The oscillation of the air bubble transmits sounds downward through the seafloor and the amount of sound transmitted in the near horizontal directions is reduced. However, the airgun array also emits sound that travels horizontally toward non-target areas. The nominal source levels of the airgun array that will be used by the Navy on the Melville are 234 dB re: 1 μ Pa_(0-p) to 240 dB re: 1 μ Pa_(p-p).

Predicted Sound Levels for the Airguns

Lamont-Doherty Earth Observatory (L-DEO) developed a verified model that predicts impulsive sound pressure field propagation and accurately describes acoustic propagation in marine waters of depths greater than 1,000 m. These model-generated sound propagation radii are routinely used for determination of received sound levels generated by impulsive sound sources, and have been previously applied in calculating the total ensonified area for use of two low-energy 105 in³ GI-guns. Modeled sound propagation radii of GI-gun sources that are the same or similar to the GI-guns used in this study, in water depths >1,000 m, are given in Table 1. These modeled acoustic propagation distances were applied in Environmental Assessments (EAs) and IHAs for seismic surveys conducted in the Eastern Tropical Pacific Ocean (ETP) off of Central America (NMFS, 2004), the Northern Gulf of Mexico (GOMEX) (L-DEO, 2003; NMFS, 2007), and the Arctic Ocean (NMFS, 2006).

For the ETP, one and three 105 in³ GI-gun arrays were modeled, with a source output level of 241 dB re 1 $\mu\text{Pa}_{(0-p)}$ and 247 dB re 1 $\mu\text{Pa}_{(p-p)}$. For the GOMEX survey, GI-gun source output levels were (a) 237 dB re 1 $\mu\text{Pa}_{(0-p)}$ and 243 dB re 1 $\mu\text{Pa}_{(p-p)}$; and (b) 229 dB re 1 $\mu\text{Pa}_{(0-p)}$ and 236 dB re 1 $\mu\text{Pa}_{(p-p)}$. L-DEO's modeling of a single G-gun has also been applied to a seismic survey in the Arctic Ocean. The source level for the 210 in³ G-gun was 246 dB re 1 $\mu\text{Pa}_{(0-p)}$ and 253 dB re 1 $\mu\text{Pa}_{(p-p)}$. However, because the G-gun generates more energy than a GI-gun of the same size, the distances for received sound levels may be an overestimate for the lower energy dual 105 in³ GI-gun source used in the ARC12 research project. The GI-gun is comprised of two, independently fired air chambers (the generator and the injector) to tune air bubble oscillation and minimize the amplitude of the acoustic pulse. In contrast, the G-gun is comprised of one chamber and generates a single, less refined injection of air into the water, which produces more acoustic energy than that of the GI-gun.

Air-gun Configuration	Water Depth (m)	Tow Depth (m)	Received Sound Levels (dB re 1 μ Pa RMS)			
			190	180	160	Location
			Distance (m)			
1 GI-gun 105 in ³	>1,000	2.5	10	27	275	ETP
3 GI-guns 105 in ³	>1,000	2.5	26	82	823	ETP
2 GI-guns 105 in ³ (a)	>1,000	3	20	69	670	GOMEX
2 GI-guns 105 in ³ (b)	>1,000	6	15	50	520	GOMEX
1 G-gun 210 in ³	>1,000	9	20	78	698	Arctic

Table 1. Modeled sound propagation radii for low-energy air-gun arrays for depths >1,000 m.

Based on extant modeling, the proposed sound propagation radii for the two 105 in³ GI-guns are 20 m, 70 m, and 670 m for the 190, 180, and 160 dB re 1 μ Pa rms isopleths, respectively (Table 2). Empirical data indicate that for deep water (>1,000 m), the L-DEO model tends to overestimate the received sound level at a given distance (Tolstoy *et al.*, 2004). It follows that the proposed sound propagation radii are considered conservative, and the actual distance at which received sound levels are 160 dB re 1 μ Pa rms or greater are expected to be less than that proposed. The proposed sound propagation radii are also consistent with recent modeling of sound propagation in the Southern Ocean (Breitzke and Bohlen, 2010).

Acoustic Source	Frequency (Hz)	Source Level (dB re 1 μ Pa)	Received Levels (dB re 1 μ Pa)		
			190	180	160
			Distance (m)		
2 GI-guns 105 in ³	10-188	~240 _(peak-to-peak)	20	70	670

Table 2. Sound propagation radii for the dual 105 in³ GI-gun array proposed for use in the ARC12 research project.

Considering the circumference of the area ensonified to the 160 dB isopleth extends to 1,340 m (twice the 670 m radius); that the GI-gun array is towed approximately 2-9 m below the surface at a speed of 4 knots (7.4 km/hr), and that the seismic oceanographic surveys will be conducted for 14 days for 24 hrs/day, the Navy estimates that the seismic oceanographic survey

distance will encompass 1,344 Nm (2,489 km). Multiplying the total linear distance of the seismic oceanographic survey by the area ensonified to the 160 dB isopleth (1,340 m), yields a total ensonified area of approximately 3,335 km².

Ocean Surveyor ADCP

A hull-mounted Teledyne RD Instruments Ocean Surveyor ADCP (TRDI OS ADCP) will be operated at 38 kHz with acoustic output pressure of 224 dB re 1 μ Pa. The beamwidth will be 30 degrees off nadir and the acoustic pressure along each beam is estimated at 180 dB re 1 μ Pa at 114 m. The TRDI OS ADCP will operate concurrently with the GI-gun array and intermittently to map the distribution of water currents and suspended materials in the water column.

Lowered ADCP (L-ADCP)

A lowered Teledyne RD Instruments ADCP (L-ADCP) will be mounted on a rosette with a conductivity-temperature-depth gauge. The beamwidth will be 30 degrees off nadir and the output pressure will be 216 dB re 1 μ Pa at 300 kHz. The L-ADCP will be deployed intermittently to collect hydrographic data.

Moored ADCP

Up to four long-range ADCPs (LR-ADCPs) will be anchored on the sea floor using 400 kilograms (kg) of scrap iron (assemblage of four scrap locomotive wheels). LR-ADCPs will be moored to the sea floor at an estimated 3,000 m, such that they float at a depth of 500 m below the sea surface. LR-ADCPs will be suspended from the iron anchorage assemblies by a single line comprised of $\frac{3}{4}$ -inch (in) nylon line and $\frac{1}{2}$ -in wire rope. The LR-ADCPs and suspension line will be recovered at the close of the study via an acoustic release and the iron anchorage assembly will remain on the sea floor. The acoustic source frequency will be 75 kHz with an output pressure level of 200 dB re 1 μ Pa at a rate of once per second. The beamwidth will be

four degrees and directed vertically upward at 20 degrees. LR-ADCPs will be moored several kilometers apart, in the area of the ARC/ACC frontal system, with exact mooring locations to be determined onsite due to the natural meander of the currents and front. LR-ADCPs will operate continuously for the estimated 14 days of research before being recovered.

Multibeam Echosounder

The Melville will operate a hull-mounted Kongsberg EM 122 multibeam echosounder (MBES) at 10.5 to 13 kilohertz (kHz). The MBES will generate acoustic pulses in a downward fan-shaped beam, one degree fore-aft and 150 degrees athwartship. For deep water operations, each “ping” is comprised of eight (>1,000 m depth; 3,280 ft) or four (<1,000 m depth; 3,280 ft) successive acoustic transmissions 2 to 100 milliseconds (ms) in duration. The maximum sound pressure output level would be 242 dB re 1 μ Pa.

Sub-bottom Profiler

The Melville will also operate a Knudsen 320B/R sub-bottom profiler (SBP). The SBP is dual-frequency and operates at 3.5 and 12 kHz with maximum power outputs of 10 kilowatts (kW) and 2 kW, respectively. The pulse length used during this study will be 0.8 to 24 ms, relative to water depth and sediment characteristics. The pulse repetition rates will be between 0.5 and 2 seconds (s) in shallow water and up to 8 s in deep water. A common operational mode is broadcast of five pulses at 1-s intervals followed by a 5-s delay. Maximum acoustic output pressure will be 211 dB re 1 μ Pa at 3.5 kHz; however, systems are typically used at 80 percent capacity. The SPB emits a downward conical beam with a width of about 30 degrees.

Comments and Responses

A proposed authorization and request for public comments was published in the Federal Register on November 21, 2011 (76 FR 71940). During the 30-day public comment period,

NMFS received comments from the Marine Mammal Commission (Commission) and one individual. The individual was generally opposed to the proposed authorization and the killing of marine mammals. The Navy did not request and NMFS is not authorizing the serious injury or mortality of marine mammals. All comments have been compiled and posted at <http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>. Any application-specific comments that address the statutory and regulatory requirements or findings NMFS must make to issue an IHA are addressed in this section of the Federal Register notice.

Comment 1: The Commission recommends that NMFS require the Navy to re-estimate the proposed exclusion and buffer zones for the two-airgun array and associated numbers of marine mammal takes using operational and site-specific environmental parameters. If the exclusion and buffer zones are not re-estimated, the Commission recommends that NMFS require the Navy to provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the southwestern Indian ocean on modeling that relies on measurements from the Gulf of Mexico.

Response: NMFS disagrees that the Navy should re-estimate the proposed exclusion and buffer zones for the two-airgun array. The proposed exclusion and buffer zones are based on modeled and measured data from L-DEO. Empirical data indicate that for deep water (>1,000 m), L-DEO-modeled data tends to overestimate the received sound level at a given distance. The ARC12 research project will be conducted in waters up to 5,000 m (16,404 ft) in depth. Therefore, the sound propagation radii are considered conservative and the Navy expects the actual distance at which received levels reach 160 dB to be less. The sound propagation radii are also consistent with recent modeling of sound propagation in the Southern Ocean (Breitzke and Bohlen, 2010).

Comment 2: The Commission recommends that NMFS require the Navy to use species-specific mean maximum densities, rather than the mean average densities, and then re-estimate the anticipated number of takes.

Response: NMFS disagrees that the Navy should use mean maximum densities, rather than mean average densities. Marine mammal population density estimates were derived from the Navy Global Marine Species Density Database, which includes the highest quality, spatially modeled density data where available. Population density estimates were also evaluated relative to data on marine mammal population distributions, occurrence, status, and critical habitat, derived from: the Ocean Biogeographic Information System Seamap (OBIS-SEAMAP); the International Union for Conservation of Nature (IUCN, 2010); the Convention on the Conservation of Migratory Species of Wild Animals (CMS, 2010); NatureServe Explorer (NatureServe, 2010); the International Whaling Commission (IWC); and NOAA Fisheries Office of Protected Resources. The average (or best) population density data was used in exposure assessment, and is considered the most reasonable estimate to employ for this research endeavor, location, and time of year. The average (or best) population density data is also consistent with what NMFS has analyzed for previous seismic surveys.

Due to lack of detailed information on marine mammal population distributions and densities in the research area, informed assumptions on the exact distribution patterns of animals cannot be made. Therefore, exposure estimates are based on uniform distribution of marine mammals over the area for which population data is available. Many species are unlikely to be found in numbers that peak population density estimates suggest. During the January-February period, when the ARC12 research project is planned, many marine mammals will be outside of the action area.

Comment 3: The Commission recommends that NMFS require the Navy to extend the pause in airgun activity following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered.

Response: NMFS believes that 15 min (for small whales and pinnipeds) and 30 min (for large whales) are appropriate periods of time to wait if the protected species observer (PSO) has not re-sighted the animal. Full, or maximum, dive times vary widely among species and NMFS considers 30 min a reasonable time to cease airgun activity on sighting of an animal, and sufficient to allow enough distance to develop between the research vessel and the animal. NMFS believes that the proposed monitoring and mitigation efforts will be effective in minimizing any incidental exposure of marine mammals to sounds generated by the airguns.

Description of the Marine Mammals in the Area of the Specified Activity

Forty marine mammal species are known to inhabit waters between South Africa and Antarctica. Six of these species are listed as endangered under the United States Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.) and depleted under the MMPA, including the southern right (*Eubalaena australis*), humpback (*Megaptera novaeangliae*), sei (*Balaenoptera borealis*), fin (*Balaenoptera physalus*), blue (*Balaenoptera musculus*), and sperm (*Physeter macrocephalus*) whales. Most of the species occurring in the area spend the austral summer in preferred Antarctic habitats, and the austral winter in areas northward around the east and west coasts of Africa, South America, Australia, and islands of the Indian Ocean. Estimates of marine mammal population densities, anticipated occurrence, primary habitat(s), and ESA listing status for the forty marine mammal species were provided in the notice of proposed IHA (76 FR 71940, November 21, 2011).

Potential Effects of the Specified Activity on Marine Mammals

Acoustic stimuli generated by the operation of airguns, which introduce sound into the marine environment, may have the potential to cause Level B harassment of marine mammals in the proposed survey area. The effects of sounds from airgun operations might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent impairment, or non-auditory physical or physiological effects (Richardson *et al.*, 1995; Gordon *et al.*, 2004; Nowacek *et al.*, 2007; Southall *et al.*, 2007).

Permanent hearing impairment, in the unlikely event that it occurred, would constitute injury, but temporary threshold shift (TTS) is not considered an injury but rather a type of Level B harassment (Southall *et al.*, 2007). Although the possibility cannot be entirely excluded, it is unlikely that the proposed project would result in any cases of temporary or permanent hearing impairment, or any significant non-auditory physical or physiological effects. Based on the available data and studies described here, some behavioral disturbance is expected, but NMFS expects the disturbance to be localized and short-term.

The notice of the proposed IHA (76 FR 71940, November 21, 2011) included a discussion of the effects of sounds from seismic activities on cetaceans and pinnipeds. NMFS refers the reader to the Navy's application and NMFS' EA (<http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>) for additional information on the behavioral reactions by all types of marine mammals to seismic activities.

Anticipated Effects on Marine Mammal Habitat

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), and there will be no physical damage to any habitat. While it is anticipated that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification,

this impact to habitat is temporary and reversible and was considered in the notice of the proposed IHA (76 FR 71940, November 21, 2011) as behavioral modification. The main impact associated with the proposed activity will be temporarily elevated noise levels and the associated direct effects on marine mammals, also discussed in the notice of the proposed IHA.

Anticipated Effects on Fish

One reason for the adoption of airguns as the standard energy source for marine seismic surveys is that, unlike explosives, they have not been associated with large-scale fish kills. However, existing information on the impacts of seismic surveys on marine fish populations is limited. There are three types of potential effects of exposure to seismic surveys: (1) pathological, (2) physiological, and (3) behavioral. A general synopsis of the available information on the effects of exposure to seismic and other anthropogenic sound as relevant to fish was provided in the notice of proposed IHA (76 FR 71940, November 21, 2011).

Anticipated Effects on Invertebrates

The existing body of information on the impacts of seismic survey sound on marine invertebrates is very limited. However, there is some unpublished and very limited evidence of the potential for adverse effects on invertebrates, thereby justifying further discussion and analysis of this issue. The three types of potential effects of exposure to seismic surveys on marine invertebrates are pathological, physiological, and behavioral. Based on the physical structure of their sensory organs, marine invertebrates appear to be specialized to respond to particle displacement components of an impinging sound field and not to the pressure component (Popper *et al.*, 2001). A synopsis of available information on the effects of exposure to seismic survey sound on species of decapod crustaceans and cephalopods, the two taxonomic groups of

invertebrates on which most such studies have been conducted was included in the notice of proposed IHA (76 FR 71940, November 21, 2011).

In conclusion, NMFS has determined that the Navy's marine seismic survey is not expected to have any habitat-related effects that could cause significant or long-term consequences for marine mammals or the food sources that they utilize.

Mitigation

In order to issue an incidental take authorization (ITA) under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and the availability of such species or stock for taking for certain subsistence uses.

The Navy will implement the following mitigation measures during the seismic survey:

Exclusion Zones

The Navy used the exposure threshold isopleths applicable to cetaceans and pinnipeds, as well as extant models of same/similar GI-gun sources and water depths, as the basis for their exclusion zones. The exclusion zone will be 70 m for the 180 dB exposure thresholds and will be employed for monitoring.

Speed or Course Alteration

If a marine mammal is observed moving on a path toward an exclusion zone, an attempt will be made to adjust the vessel speed or course in order to minimize the likelihood of an animal entering an exclusion zone. Speed and course alterations are not always possible when towing a long GI-gun array, but are considered possible options given the use of a dual GI-gun array.

Shut-down Procedures

The Navy will shut down the operating airgun array if a marine mammal is seen within or approaching an exclusion zone. The Navy will implement a shut-down if a cetacean is observed within or approaching the 180 dB isopleth (70 m). Airgun activity will not resume until the marine mammal has cleared the exclusion zone or has not been seen for 15 (dolphins) to 30 minutes (whales).

Ramp-up Procedures

Ramp-up will 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 will be activated in a sequence such that the source level of the array will increase in steps not exceeding 6 dB per 5-min periods over a total duration of 30 min. During ramp-up, protected species observers will monitor the exclusion zones for marine mammals and a shutdown will be implemented if an animal is detected in or approaching an exclusion zone.

NMFS carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included 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.

Based on our evaluation of the applicant's proposed measures, NMFS determined that the above mitigation measures provide the means of effecting the least practicable impacts on

marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth “requirements pertaining to the monitoring and reporting of such taking.” The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for IHAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area.

Monitoring

The Navy will sponsor marine mammal monitoring during the proposed activity, in order to implement the mitigation measures that require real-time monitoring, and to satisfy the monitoring requirements of the IHA. The Navy’s monitoring plan is described below.

Vessel-based Visual Monitoring

The Navy will continuously monitor the harassment isopleths during daytime and nighttime airgun operations. Visual monitoring will be comprised of three protected species observers (PSOs) typically working in shifts of 4-hr durations or less. A PSO platform is located one deck below and forward of the bridge (12.5 m [41 ft] 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 will systematically survey the area around the vessel with reticle and big-eye binoculars and the naked eye. A clinometer will 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 will be used to measure the exact location of the exclusion zones. During nighttime operations, night vision devices will be available if required.

The PSOs will be in wireless communication with 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. Shutdown of GI-gun operations will occur immediately upon observation/detection of any marine mammal in an exclusion zone. Following a shutdown, GI-gun ramp-up will not be initiated until PSOs have confirmed the marine mammal is no longer observed/detected for a period of 15 or 30 minutes (depending on species). If a marine mammal is outside of an exclusion zone and observed by a PSO to exhibit abnormal behaviors consistent with signs of harassment (e.g., avoidance, dive patterns, multiple changes in direction), operation of the GI-guns will cease until the animal moves out of the area or is not resighted for a period of 30 min.

PSO Data and Documentation

PSOs will record data to estimate the numbers of marine mammals exposed to various received sound levels and to document apparent disturbance reactions or lack thereof. Data will be used to estimate numbers of animals potentially 'taken' by harassment (as defined in the MMPA). They will also provide information needed to order a power down or shut down of the airguns when a marine mammal is within or nearing the exclusion zone.

When a sighting is made, the following information will be recorded:

1. Time, location, heading, speed, activity of the vessel, sea state, visibility, and sun glare;
2. Species, group size, age, individual size, sex (if determinable);
3. Behavior when first sighted and subsequent behaviors;

4. Bearing and distance from the vessel, sighting cue, exhibited reaction to the airgun sounds or vessel (e.g., none, avoidance, approach, etc.), behavioral pace, and depth at time of detection;

5. Fin/fluke characteristics and angle of fluke when an animal submerges to determine if the animal executed a deep or surface dive;

6. Type and nature of sounds heard; and

7. Any other relevant information.

When shutdown is required for mitigation purposes, the following information will be recorded:

1. The basis for decisions resulting in shutdown of the GI-guns;

2. Information needed to estimate the number of marine mammals potentially taken by harassment;

3. Information on the frequency of occurrence, distribution, and activities of marine mammals in the study area;

4. Information on the behaviors and movements of marine mammals during and without operation of the GI-guns; and

5. Any adverse effects the shutdown had on the research.

PSOs will provide estimates of the numbers of marine mammals exposed to the GI-gun source and any disturbance reactions exhibited, or the lack thereof. Observations and data collection will aim to provide estimates of the actual numbers of animals taken, verify the level of harassment, aide in assessment of impacts on populations on conclusion of the study, and increase knowledge of species in the study area. Observations and data collection will also aim to provide information that will allow for verifying or disputing that the takings are negligible.

Reporting

The Navy will submit a report to NMFS within 90 days after the end of the cruise. The report will describe the operations that are conducted and sightings of marine mammals near the operations. The report will provide full documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day report will summarize the dates and locations of seismic operations, and all marine mammal sightings (dates, times, locations, activities, associated seismic survey activities). The report will also include estimates of the number and nature of exposures that could result in “takes” of marine mammals.

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), the Navy will immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel’s speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hrs preceding the incident;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hrs preceding the incident;
- Species identification or description of the animal(s) involved;

- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities will not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with the Navy to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The Navy may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that the Navy discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), the Navy will immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with the Navy to determine whether modifications in the activities are appropriate.

In the event that the Navy discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the Navy will report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS within 24 hrs of the discovery. The Navy will provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS.

Estimated Take by Incidental 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].

Only take by Level B harassment is authorized as a result of the physical oceanographic survey off the southern coast of Africa. Acoustic stimuli (i.e., increased underwater sound) generated during the operation of the dual airgun array may have the potential to cause marine mammals in the survey area to be exposed to sounds at or greater than 160 dB or cause temporary, short-term changes in behavior. There is no evidence that the planned activities will result in injury, serious injury, or mortality within the specified geographic area for which the Navy seeks the IHA. NMFS determined that the required mitigation and monitoring measures will minimize any potential risk for injury or mortality.

NMFS included an in-depth discussion of the methods used to calculate the densities of marine mammals in the area of the survey in a previous notice for the proposed IHA (76 FR 71940, November 21, 2011). A summary is included here.

The estimates are based on a consideration of the number of marine mammals that could be disturbed appreciably by operations with the GI-gun array to be used during multiple transects totaling approximately 2,489 km (1,547 mi). Density estimates on the marine mammal species in the survey area are based on data derived from a number of sources: the Ocean Biogeographic Information System OBIS Seamap (OBIS-SEAMP); the International Union for Conservation of Nature (IUCN, 2010); the Convention on the Conservation of Migratory Species of Wild Animals (CMS, 2010); NatureServe Explorer (NatureServe, 2010); the International Whaling

Commission (IWC); NOAA Fisheries Office of Protected Resources; and the Navy Marine Species Density Database (NMSDD); unless otherwise cited.

One method of estimating takes assumes marine mammals are uniformly distributed throughout a given area, although this is not representative of the real world distribution of marine mammals in any given geographic region. Marine mammals are typically found grouped in pods, concentrate around preferred breeding and foraging habitats, and most species follow seasonal migratory patterns and routes. However, due to lack of substantive information on marine mammal population distributions and densities in the area of the proposed action, informed assumptions on distribution patterns cannot be made, and exposure estimates are based on uniform distribution of marine mammals over the area for which population data are available. Bearing these factors in mind, the exposure estimates provided are considered reasonable approximations of potential exposure, and based on the best available information.

Table 3 provides estimates of the minimum, average (considered the best estimate), and maximum marine mammal population densities in the area of the proposed study during the austral summer, anticipated occurrence of each species, and requested take authorization. For all species evaluated, average population density estimates were used for calculation of the number of marine mammals that may be exposed. NMFS has used average (or best) population density estimates when analyzing the allowable harassment for ESA-listed marine mammals incidental to marine seismic surveys for scientific research purposes (e.g., see NMFS 2010c, 2011c). The results of the monitoring reports from those surveys, and others, show that the use of the average estimate is appropriate for provision of reasonable estimates of exposure and harassment.

Because extant mathematical models poorly simulate and predict the natural meander of the AC, ARC, and ARC/ACC frontal system, and due to unpredictable weather conditions, it is not

possible to accurately predict the exact location where seismic oceanographic survey transects would occur. For this reason, the minimum, average, and maximum population densities given in Table 3 are the mean of the population densities for each species within the coordinates of 36°S to 43°S, and 19°E to 30°E. The front is estimated to be phase-locked between 36°S to 40°S, and 21°E to 27°E; however, the position of the front can vary by up to 100 km (generally west, east, and south of this estimated location). Because the precise location of the seismic oceanography survey transects cannot be known in advance, it is not possible to accurately differentiate the numbers of marine mammals that may be exposed in waters of the global commons (high seas), as opposed to within the South African exclusive economic zone (EEZ). Because the specific location of research activities cannot be predetermined, due to the variables described, this assessment conservatively estimates that all exposures occur in waters of the global commons (high seas) where estimated population density estimates are higher.

Based on the best available population density estimates, 2,412 cetacea may potentially be exposed to sound pressure levels ≥ 160 dB re 1 μ Pa.rms. Of the total number of cetaceans that are estimated to be exposed, 62 are listed as endangered under the ESA: 29 fin (<0.2% of the southern hemisphere population), 1 humpback (<0.004% of the southern hemisphere population), 11 sei (<0.2% of the population south of 30°S), 1 southern right (<0.004% of the southern hemisphere population), and 20 sperm (<0.02% of the southern hemisphere population) whales. For all species, the number of individuals that would be exposed to sounds ≥ 160 dB re 1 μ Pa.rms is less than 0.2 percent of the given species' population for which regional population density estimates are known.

Species	ESA ¹	Density			Authorized take
		Best	Min	Max	
<i>Mysticetes</i>					
Antarctic minke whale	NL	<0.01	<0.01	0.01	14
Bryde's whale	NL	<0.01	<0.01	<0.01	1
Common minke whale	NL	0.03	0.02	0.05	103
Fin whale	E	0.01	<0.01	0.01	29
Humpback whale	E	<0.01	<0.01	<0.01	1
Sei whale	E	<0.01	<0.01	<0.01	11
<i>Odontocetes</i>					
Arnoux's beaked whale	NL	<0.01	<0.01	0.01	15
Cuvier's beaked whale	NL	<0.01	<0.01	<0.01	12
Gray's beaked whale	NL	<0.01	<0.01	<0.01	11
Hector's beaked whale	NL	<0.01	<0.01	<0.01	9
Southern bottlenose whale	NL	<0.01	<0.01	0.01	21
Southern right whale	E	<0.01	<0.01	<0.01	1
Sperm whale	E	0.01	<0.01	0.01	20
Strap-toothed whale	NL	<0.01	<0.01	<0.01	9
True's beaked whale	NL	<0.01	<0.01	<0.01	10
Common bottlenose dolphin	NL	0.04	0.01	0.10	141
False killer whale	NL	<0.01	<0.01	<0.01	1
Hourglass dolphin	NL	<0.01	<0.01	<0.01	3
Killer whale	NL	0.01	<0.01	0.01	30
Long-beaked common dolphin	NL	<0.01	<0.01	<0.01	1
Long-finned pilot whale	NL	0.05	<0.01	0.10	180
Pantropical spotted dolphin	NL	0.01	<0.01	0.01	20
Pygmy killer whale	NL	<0.01	<0.01	<0.01	1
Risso's dolphin	NL	0.06	0.04	0.10	210
Rough-toothed dolphin	NL	<0.01	<0.01	<0.01	2

Species	ESA ¹	Density			Authorized take
		Best	Min	Max	
Short-beaked common dolphin	NL	0.24	0.13	0.38	799
Short-finned pilot whale	NL	0.03	0.01	0.04	86
Southern right whale dolphin	NL	0.01	<0.01	0.02	29
Spinner dolphin	NL	<0.01	<0.01	0.01	16
Striped dolphin	NL	0.19	0.03	0.31	626

Table 3. Estimated number of marine mammals exposed to ≥ 160 dB during the proposed activity.

Exposure estimates are based on marine mammal population density estimates relative to the total area ensonified by the GI-gun array, and evaluated for exposure to the 160 dB isopleth. Multiplying the total area ensonified during the seismic oceanography survey by the population estimate for each species, yields the estimated number of marine mammals exposed to sound pressures >160 dB. The total ensonified area is about 3,335 km² and assumes no area of overlap during the survey transects, which will cover a total distance of 2,489 km.

Negligible Impact and Small Numbers Analysis and Preliminary Determination

NMFS has defined “negligible impact” in 50 CFR 216.103 as “...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.” In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to:

- (1) The number of anticipated mortalities;
- (2) The number and nature of anticipated injuries;
- (3) The number, nature, and intensity, and duration of Level B harassment; and
- (4) The context in which the takes occur.

As mentioned previously, NMFS estimates that 30 species of marine mammals could be potentially affected by Level B harassment over the course of the IHA. For each species, these numbers are small (less than one percent) relative to the population size.

No injuries, serious injuries, or mortalities are anticipated to occur as a result of the Navy's planned physical oceanographic survey, and none are authorized by NMFS. Additionally, for reasons presented in the notice of proposed IHA (76 FR 71940, November 21, 2011), temporary hearing impairment (and especially permanent hearing impairment) is not anticipated to occur during the proposed specified activity. Only short-term behavioral disturbance is anticipated to occur due to the brief and sporadic duration of the survey activities. No mortality or injury is expected to occur, and due to the nature, degree, and context of behavioral harassment anticipated, the activity is not expected to impact rates of recruitment or survival.

NMFS has determined, provided that the aforementioned mitigation and monitoring measures are implemented, that the impact of conducting a physical oceanographic survey off the southern coast of Africa, may result, at worst, in a temporary modification in behavior and/or low-level physiological effects (Level B harassment) of small numbers of certain species of marine mammals.

Of the ESA-listed marine mammals that may potentially occur in the survey area, blue and southern right whale populations are thought to be increasing; population trends for fin, humpback, sei, and sperm whales are not well known in the southern hemisphere. However, no take of blue whales was requested because of the low likelihood of encountering this species during the survey. There is no designated critical habitat for marine mammals in the survey area. There are also no important habitat areas (e.g., breeding, calving, feeding, etc.) for marine mammals known around the area that would overlap with the survey. While behavioral

modifications, including temporarily vacating the area during the operation of the airgun(s), may be made by these species to avoid the resultant acoustic disturbance, the availability of alternate areas within these areas and the short and sporadic duration of the research activities, have led NMFS to determine that this action will have a negligible impact on the species in the specified geographic region.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that the Navy's planned research activities (and the resulting total taking from the survey): (1) will result in the incidental take of small numbers of marine mammals, by Level B harassment only; (2) will have a negligible impact on the affected species or stocks; and (3) will have mitigated impacts to affected species or stocks of marine mammals to the lowest level practicable.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks will not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Of the species of marine mammals that may occur in the proposed survey area, six are listed as endangered under the ESA, including the blue, fin, humpback, sei, southern right, and sperm whales. Under section 7 of the ESA, the Navy initiated formal consultation with NMFS, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this survey. NMFS' Office of Protected Resources, Permits and Conservation Division, also initiated

formal consultation under section 7 of the ESA with NMFS' Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, to obtain a Biological Opinion evaluating the effects of issuing the IHA on threatened and endangered marine mammals and, if appropriate, authorizing incidental take.

The Biological Opinion was issued on January 20, 2012, and concluded that the specified activity and issuance of the IHA are not likely to jeopardize the continued existence of blue, fin, humpback, sei, southern right, or sperm whales. The Biological Opinion also concluded that designated critical habitat for these species does not occur in the survey area and would not be affected by the survey. The Navy, in addition to the mitigation and monitoring requirements included in the IHA, will be required to comply with the Terms and Conditions of the Incidental Take Statement corresponding to NMFS' Biological Opinion issued to both the Navy and NMFS' Office of Protected Resources, Permits and Conservation Division.

National Environmental Policy Act (NEPA)

To meet NMFS' NEPA requirements for the issuance of an IHA to the Navy, NMFS prepared an Environmental Assessment (EA), titled "Issuance of an Incidental Harassment Authorization to the Navy to Take Marine Mammals by Harassment Incidental to a Physical Oceanographic Survey in the Southwest Indian Ocean." NMFS provided relevant environmental information to the public through the notice for the proposed IHA (76 FR 71940, November 21, 2011) and has considered public comments received in response prior to finalizing the EA and deciding whether or not to issue a Finding of No Significant Impact (FONSI).

NMFS concluded that issuance of an IHA would not significantly affect the quality of the human environment and has issued a FONSI. Therefore, it is not necessary to prepare an Environmental Impact Statement for the issuance of an IHA to the Navy for this activity. The

EA and FONSI for this activity can be viewed on NMFS' website
(<http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>).

Authorization

As a result of these determinations, NMFS has issued an IHA to the Navy for conducting a physical oceanographic survey off the southern coast of Africa, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Date: January 20, 2012.

James H. Lecky,
Director, Office of Protected Resources,
National Marine Fisheries Service.

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