LIST OF PETITIONS RECEIVED BY EDA FOR CERTIFICATION OF ELIGIBILITY TO APPLY FOR TRADE ADJUSTMENT 8/17/2010 THROUGH 8/27/2010

Firm name	Address	Date accepted for filing	Products
American Standard Circuits, Inc.	475 Industrial Drive, West Chicago, IL 60185.	08/18/10	The company is a manufacturer of printed circuit boards for the military, aerospace, industrial, commercial, medical, telecommunications, computer, radar and transportation industries.
Diamond Roltran, LLC	59 Porter Road, Littleton, MA 01460.	08/27/10	The company manufactures roll rings. Roll rings transfer power, data and signals over rotary interfaces. They are custom designed, although there are four basic types: Flexures, couplers, roll blocks and flex wheels.
Manchester Wood, Inc	180 North Street, Granville, NY 12832–9438.	08/18/10	The company produces wooded furniture for the retailing industry including TV tray tables, kitchen gourmet carts and Adirondack style furniture.
McVan, Inc	35 Frank Mossberg Drive, Attleboro, MA 02703.	08/23/10	The company manufactures gold, silver and pewter jewelry and religious products. Their manufacturing process consists of stamping and casting.

Any party having a substantial interest in these proceedings may request a public hearing on the matter. A written request for a hearing must be submitted to the Trade Adjustment Assistance for Firms Division, Room 7106, Economic Development Administration, U.S. Department of Commerce, Washington, DC 20230, no later than ten (10) calendar days following publication of this notice.

Please follow the procedures set forth in Section 315.9 of EDA's final rule (71 FR 56704) for procedures for requesting a public hearing. The Catalog of Federal Domestic Assistance official program number and title of the program under which these petitions are submitted is 11.313, Trade Adjustment Assistance.

Dated: August 27, 2010.

Miriam J. Kearse,

Program Team Lead.

[FR Doc. 2010–22123 Filed 9–2–10; 8:45 am]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XY12

Takes of Marine Mammals Incidental to Specified Activities; Low-Energy Marine Seismic Survey in the Eastern Tropical Pacific Ocean Off Central and South America, October–November 2010

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

ACTION: Notice; proposed Incidental Harassment Authorization; request for comments.

SUMMARY: NMFS has received an application from the Scripps Institution of Oceanography (SIO) of the University of California for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to conducting a low-energy marine seismic survey. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to SIO to take, by Level B Harassment only, 21 species of marine mammals during the specified activity.

DATES: Comments and information must be received no later than October 4, 2010.

ADDRESSES: Comments on the application should be addressed to Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. The mailbox address for providing e-mail comments is *PR1.0648–XY12@noaa.gov.* NMFS is not responsible for e-mail comments sent to addresses other than the one provided here. Comments sent via e-mail, including all attachments, must not exceed a 10-megabyte file size.

Instructions: All comments received are a part of the public record and will generally be posted to *http://www.nmfs.noaa.gov/pr/permits/incidental.htm* without change. All Personal Identifying Information (for example, name, address, *etc.*) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

A copy of the application containing a list of the references used in this document may be obtained by writing to the address specified above, telephoning the contact listed below (*see* **FOR FURTHER INFORMATION CONTACT**), or visiting the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* The National Science Foundation (NSF), which is providing funding for the proposed action, has prepared a draft Environmental Assessment (EA) titled "Marine Geophysical Survey by the R/V *Melville* in the Pacific Ocean off Central and South America, October–November 2010". The NSF draft EA incorporates an "Environmental Assessment of a Marine Geophysical Survey by the R/V *Melville* in the Pacific Ocean off Central and South America, October–November 2010", prepared by LGL Limited, Environmental Research Associates, on behalf of NSF. These associated documents, prepared in compliance with the National Environmental Policy Act (NEPA), are also available at the same Internet address. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Ben Laws or Candace Nachman, Office of Protected Resources, NMFS, (301) 713–2289.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, 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 either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. 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 U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) 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 marine mammals. Within 45 days of the close of the 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 May 28, 2010 from SIO for the taking, by harassment, of marine mammals incidental to conducting, in collaboration with Texas A&M University and with research funding provided by the National Science Foundation, a low-energy marine seismic survey. NMFS reviewed SIO's application and identified a number of issues requiring further clarification. After addressing comments from NMFS, SIO modified its application and submitted a revised application on July 14, 2010. NMFS carefully evaluated SIO's application, including their analyses, and determined that the application is complete and provides sufficient data for NMFS to make the necessary preliminary determinations pursuant to the MMPA. The July 14, 2010 application is the one available for public comment (*see* **ADDRESSES**) and considered by NMFS for this proposed IHA.

The proposed survey will occur in the Eastern Tropical Pacific Ocean (ETP), encompassing the area from approximately 8° N–12° S and 80–91° W, off the coasts of Costa Rica, Panama, Colombia, Ecuador, and Peru, in International Waters and within the Exclusive Economic Zones (EEZs) of Costa Rica, Panama, Colombia, and Ecuador, and is scheduled to occur from October 19–November 14, 2010. Some minor deviation from these dates is possible, depending on logistics and weather. The survey will use a pair of Generator Injector (GI) airguns, each with a discharge volume of 45 in^3. Seismic airgun operations are expected to result in the incidental take, by Level B harassment only, of up to 21 species of marine mammals. These species include: Bryde's whale; blue whale; sperm whale; humpback whale; Cuvier's beaked whale; Blainville's beaked whale; pygmy beaked whale; gingko-toothed beaked whale; rough-toothed dolphin; bottlenose dolphin; pantropical spotted dolphin; spinner dolphin; striped dolphin; Fraser's dolphin; short-beaked common dolphin; Risso's dolphin; melon-headed whale; pygmy killer whale; false killer whale; killer whale; and short-finned pilot whale.

Description of the Specified Activity

SIO plans to conduct a seismic survey as part of an integrated geophysical and geochemical study. In addition to the GI airguns, a multibeam echosounder (MBES) and a sub-bottom profiler (SBP) will be utilized for research purposes. The planned survey will involve one source vessel, the R/V *Melville* (*Melville*).

The purpose of this project is to better understand how marine sediments record paleo-oceanographic information. The deposition of sediments in the upper 500 m (1640.4 ft) of the sediment column will be studied using known seismic horizons in the sediment column to estimate rates of deposition downstream from potential sediment sources on the topographic highs and to estimate loss from the ridges. The seismic survey and associated coring and water sampling will allow comparisons of geophysical estimates of the level of erosion from marine ridges and highs with geochemical estimates of sediment focusing based upon the distribution of Th-230, a particle-reactive isotope produced by the decay of dissolved uranium in the water column. In addition, the study will examine whether there are sediment sources for Th-230 in slowly-accumulating sediments.

The *Melville* is expected to depart Puntarenas, Costa Rica, on October 19, 2010, and spend approximately 15 days conducting seismic surveys, 10 days collecting water and core samples, and approximately 2 days in transit, arriving at Arica, Chile, on November 14, 2010. At each of four sites (*see* Figure 1 of SIO's application), seismic operations will be conducted for approximately 2 days, and each water sampling and coring station will be occupied for 1–2 days. Some minor deviation from these dates is possible, depending on logistics and weather.

The source vessel, the *Melville,* will deploy a pair of low-energy GI airguns as an energy source at a depth of 2 m (each with a discharge volume of 45 in^3), plus either of two towed hydrophone streamers, one 725 m (2378.6 ft) long with 40 channels, and the other 350 m (1148.3 ft) long with 16 channels. Hydrophone streamers are towed at adjustable depth to afford best reception of returning seismic signals, depending upon surface conditions, but are typically towed in at approximately 10 m. The energy to the GI airgun is compressed air supplied by compressors onboard the source vessel. As the GI airgun is towed along the survey lines, the receiving systems will receive the returning acoustic signals.

In addition to the GI airguns, an MBES and an SBP will be used throughout the cruise, except while at water/core stations, to help verify seafloor conditions at possible coring sites and to collect additional seafloor bathymetric data. Passive geophysical sensors (a gravimeter and a magnetometer) will also be operated continuously throughout the entire cruise.

All potential incidental take, by harassment only, is expected to result from the operation of the GI airguns. Take is not expected to result from the use of the MBES or SBP, for reasons discussed below, or from collision with the vessel because it is a single vessel, moving at a relatively slow speed (operational speeds of approximately 11 km/hr [6 knots] during seismic acquisition within the survey areas and 15–18.5 km/hr [8–10 knots] between survey areas and stations), for a relatively short period of time (approximately 30 days). It is likely that any marine mammal would be able to avoid the vessel.

The seismic program will consist of approximately 5475 km (3402 mi) of survey lines, including turns (*see* Figure 1 of SIO's application). Water depths at the seismic survey locations are approximately 1000–4800 m (3280.8–15,748 ft). The GI airguns will be operated on a small grid for approximately 45 hours at each of four sites (*see* Figure 1 of SIO's application) where the 40-channel streamer will be used, and for most of the time during transits between the sites, to the first site, and after the last site, where the 12-channel streamer will be used. There will be additional seismic operations associated with equipment testing, startup, and possible line changes or repeat coverage of any areas where initial data quality is sub-standard. Those additional operations are allowed for in the estimated total line-kilometers given above. The *Melville* is expected to depart Puntarenas, Costa Rica, on October 19, 2010 and spend approximately 15 days conducting seismic surveys, 10 days collecting water and core samples, and approximately 2 days in transit, arriving at Arica, Chile, on November 14, 2010.

All planned geophysical data acquisition activities will be conducted by SIO with on-board assistance by the scientists who have proposed the study. The Chief Scientist is Dr. Franco Marcantonio of Texas A&M University. The vessel will be self-contained, and the crew will live aboard the vessel for the entire cruise.

Vessel Specifications

The *Melville* has a length of 85 m (278.9 ft), a beam of 14 m (45.9 ft), and a maximum draft of 5 m (16.4 ft). The ship is powered by two 1385-hp diesel engines and a 900-hp retracting azimuthing bow thruster. Operation speeds of approximately 11 km/hr (5.9 knots) and 15–18.5 km/hr (8.1–10 knots) will be used during seismic acquisition within the survey areas and between the areas and stations, respectively. When not towing seismic survey gear, the *Melville* cruises at 21.7 km/hr (11.7 knots) and has a maximum speed of 25.9 km/hr (14 knots). The *Melville* will also serve as the platform from which vessel-based protected species observers (PSOs) will watch for animals before and during airgun operations (discussed later in this document).

Acoustic Source Specifications

(1) Seismic Airguns

The *Melville* will tow a pair of 45-in^3 Sercel GI airguns and a streamer containing hydrophones along predetermined lines. Seismic pulses will be emitted at intervals of 8–10 s. At speeds of approximately 11–18.5 km/hr (5.9–10 knots), the 8–10 s spacing corresponds to shot intervals of approximately 25–50 m (82–164 ft).

The generator chamber of each GI airgun, responsible for introducing the sound pulse into the ocean, is 45 in^3. The larger (105-in^3) injector chamber injects air into the previously-generated bubble to maintain its shape and does not introduce more sound into the water. The two 45-in^3 GI airguns will be towed 8 m (26.2 ft) apart side by side, 21 m (68.9 ft) behind the *Melville,* at a depth of 2 m (6.6 ft).

As the GI airgun is towed along the survey line, the towed hydrophone array in the streamer receives the reflected signals and transfers the data to the on-board processing system. Given the relatively short streamer length behind the vessel, the turning rate of the vessel while the gear is deployed is much higher than the limit of five degrees per minute for a seismic vessel towing a streamer of more typical length (greater than l km (0.6 mi)). Thus, the maneuverability of the vessel is not limited much during operations.

The root mean square (rms) received levels that are used as impact criteria for marine mammals are not directly comparable to the peak (pk or 0-pk) or peak-to-peak (pk-pk) values normally used to characterize source levels of airgun arrays. The measurement units used to describe airgun sources, peak or peak-to-peak decibels, are always higher than the rms decibels referred to in biological literature. A measured received level of 160 dB re 1 μPa (rms) in the far field would typically correspond to a peak measurement of approximately 170 dB and to a peak-to-peak measurement of approximately 176–178 dB, as measured for the same pulse received at the same location (Greene, 1997; McCauley *et al.,* 1998, 2000). The precise difference between rms and peak or peak-to-peak values depends on the frequency content and duration of the pulse, among other factors. However, the rms level is always lower than the peak or peak-to-peak level for an airgun-type source. The actual received level at any location in the water near the GI airguns will not exceed the source level of the strongest individual source. In this case, that will be about 224.6 dB re 1 μPa-m peak or 229.8 dB re 1 μPa-m peak-to-peak. The dominant frequency components of the GI airguns are 0–188 Hertz (Hz).

Received sound levels have been modeled by Lamont-Doherty Earth Observatory (L–DEO) for a number of airgun configurations, including two 45 in^3 Nucleus G. Guns, in relation to distance and direction from the airgun (*see* Figure 2 of SIO's application). The model does not allow for bottom interactions and is most directly applicable to deep water. Based on the modeling, estimates of the maximum distances from the GI airguns where sound levels of 190, 180, and 160 dB re 1 μPa (rms) are predicted to be received in deep (>1,000 m (3280.8 ft)) water are shown in Table 1 below. Because the model results are for G. Guns, which have more energy than GI airguns of the same size, the distances in Table 1 overestimate the distances for the 45 in^3 GI airguns.

(2) Multibeam Echosounder and Sub-Bottom Profiler

Along with the GI airgun operations, an MBES and a SBP will be operated from the source vessel at certain times during the planned study to help verify seafloor conditions at possible coring sites and to collect additional seafloor bathymetric data.

The Kongsberg EM 122 MBES operates at 10.5–13 (usually 12) kilohertz (kHz) and is hull-mounted on the *Melville.* The transmitting beamwidth is 1° fore-aft and 150° athwartship. The maximum source level is 242 dB re 1 μPa-m (rms). Each "ping" consists of eight (in water >1000 m deep) or four (<1000 m deep) successive fan-shaped transmissions, each ensonifying a sector that extends 1° fore-aft. Continuous-wave pulses increase from 2 to 15 ms long in water depths up to 2600 m (8530.2 ft), and FM chirp pulses up to 100 ms long are used in water >2600 m. The successive transmissions span an overall cross-track angular extent of about 150°, with 2-ms gaps between the pulses for successive sectors.

The Knudsen Engineering Model 320B/R SBP is a dual-frequency transceiver designed to operate at 3.5 and/or 12 kHz. It is used in conjunction with the MBES to provide data about the sedimentary features that occur below the sea floor. The energy from the SBP is directed downward via a 3.5-kHz transducer array mounted in the hull of the *Melville.* The maximum power output of the 320B/R is 10 kilowatts for the 3.5-kHz section and 2 kilowatts for the 12-kHz section. The nominal beamwidth is 80°.

The pulse length for the 3.5-kHz section of the 320B/R is 0.8–24 ms, controlled by the system operator in regards to water depth and reflectivity of the bottom sediments and will usually be 6, 12, or 24 ms at the water depths at the study sites and in transit from Puntarenas and to Arica. The system produces one sound pulse and then waits for its return before transmitting again. Thus, the pulse interval is directly dependent upon water depth, and in this survey is 0.8–1.5 s. Using the Sonar Equations and assuming 100 percent efficiency in the system (impractical in real world applications), the source level for the 320B/R is calculated to be 211 dB re 1 μPa-m. In practice, the system is rarely operated above 80 percent power level.

(3) Safety Radii

NMFS has determined that for acoustic effects, using acoustic thresholds in combination with corresponding safety radii is an effective way to consistently apply measures to avoid or minimize the impacts of an action, and to quantitatively estimate the effects of an action. Thresholds are used in two ways: (1) To establish a mitigation shut-down or power-down zone, *i.e.,* if an animal enters an area calculated to be ensonified above the level of an established threshold, a sound source is powered down or shut down; and (2) to calculate take, in that a model may be used to calculate the area around the sound source that will be ensonified to that level or above, then, based on the estimated density of animals and the distance that the sound source moves, NMFS can estimate the number of marine mammals that may be "taken."

As a matter of past practice and based on the best available information at the time regarding the effects of marine sound, NMFS estimates that Level A harassment from acoustic sources may occur when animals are exposed to levels above 180 dB re 1 μPa (rms) level for cetaceans and 190 dB re 1 μPa (rms) for pinnipeds. A review of the available scientific data using an application of science-based extrapolation procedures (Southall *et al.,* 2007) strongly suggests that Level A harassment (as well as temporary threshold shift (TTS)) from single sound exposure impulse events may occur at much higher levels than the levels previously estimated using very limited data. However, for purposes of this proposed action, SIO's application sets forth, and NMFS is using, the more conservative 180 and 190 dB re 1 μPa (rms) criteria. NMFS also considers 160 dB re 1 μPa (rms) as the criterion for estimating the onset of Level B harassment from acoustic sources producing impulse sounds, as in this seismic survey.

Empirical data concerning the 180- and 160-dB distances have been acquired based on measurements during the acoustic verification study conducted by L–DEO in the northern Gulf of Mexico from May 27–June 3, 2003 (Tolstoy *et al.,* 2004). Although the results are limited, the data showed that radii around the airguns where the received level would be 180 dB re 1 μPa (rms), the safety criterion applicable to cetaceans (NMFS 2000), vary with water depth. Similar depth-related variation is likely in the 190 dB distances applicable to pinnipeds. Correction factors were developed for water depths 100–1000 m and <100 m. The proposed survey will occur in depths of approximately 1000–4800 m, so the correction factors for shallow water are not relevant here. All of the seismic operations will be in depths >1000 m.

The empirical data indicate that, for deep water (>1000 m), the L–DEO model tends to overestimate the received sound levels at a given distance (Tolstoy *et al.,* 2004). However, to be precautionary pending acquisition of additional empirical data, it is proposed that safety radii during GI airgun operations in deep water will be values predicted by L–DEO's model (*see* Table 1 in this document). Therefore, the assumed 180- and 190-dB radii are 40 m (131.2 ft) and 10 m (32.8 ft), respectively.

TABLE 1—PREDICTED DISTANCES TO WHICH SOUND LEVELS ≥190, 180 AND 160 DB RE 1 μPA (RMS) MIGHT BE RECEIVED FROM TWO 45 IN³ GI AIRGUNS THAT WILL BE USED DURING THE SEISMIC SURVEYS IN THE EASTERN TROPICAL PACIFIC OCEAN DURING OCTOBER-NOVEMBER 2010

[Distances are based on model results provided by L–DEO.]

Source and volume	Tow depth (m)	Water depth	Estimated distances at received levels (m)		
			190 dB	180 dB	160 dB
Two GI airguns, 45 in³ each	2	Deep (>1000 m)	10	40	400

Description of Marine Mammals in the Area of the Specified Activity

Forty-three species of marine mammals, including 29 odontocetes, 7 mysticetes, 6 pinnipeds, and the marine sea otter (*Enhydra lutris*), are known to occur in the ETP. Of these, 23 cetacean species are likely to occur in the proposed survey areas in the ETP during October–November (*see* Table 2 in this document), and are considered further here. Three of these 23 cetacean species are listed under the Endangered Species Act (ESA) as Endangered: The sperm (*Physeter macrocephalus*), humpback (*Megaptera novaeangliae*), and blue (*Balaenoptera musculus*) whales.

Nine cetacean species, although present in the wider ETP, likely would not be found in the proposed seismic survey areas because their ranges do not extend that far south or north. Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) and Baird's beaked whales (*Berardius bairdii*) are seen very occasionally in the northernmost portions of the ETP (Ferguson and Barlow, 2001). Long-beaked common dolphins (*Delphinus capensis*) are known to occur in the northernmost areas of the ETP off Baja California, Mexico, and off the coast of Peru (Heyning and Perrin, 1994). Southern right whales (*Eubalaena australis*) are seen on rare occasions off the coasts of Peru and Chile (Aguayo *et al.,* 1992; Santillan *et al.,* 2004). Gray's beaked whales (*Mesoplodon grayi*) are distributed in the southernmost portions of the ETP and off the coast of southern Peru (Culik, 2010). Dusky dolphins (*Lagenorhynchus obscurus*), southern right whale dolphins (*Lissodelphis peronii*), Burmeister's porpoises (*Phocoena spinipinnis*), and long-finned pilot whales (*Globicephala melas*) also occur near the Peruvian coast (Leatherwood *et al.,* 1991; Van Waerebeek *et al.,* 1991; Brownell and Clapham, 1999; Olson and Reilly, 2002). These nine species are not addressed in detail in SIO's application and are not considered further in this Notice of Proposed IHA.

Sei (*Balaenoptera borealis*) and fin (*B. physalus*) whales, listed as Endangered under the ESA, are known from the ETP but are considered very rare in the proposed survey area. Sei whales may have been sighted during surveys in the ETP (Wade and Gerrodette, 1993; Kinzey *et al.,* 1999, 2000, 2001); however, it is difficult to distinguish sei whales from Bryde's whales (*B. edeni*) at sea. Because sei whales generally have a more northerly and temperate distribution (Leatherwood *et al.,* 1988), Wade and Gerrodette (1993) classified any tentative sei whale observations in the ETP as Bryde's whale sightings. Sei whales may also have been sighted near the Galapagos Islands (Clarke, 1962); although, Clarke and Aguayo (1965) suggested that those sightings could have been Bryde's whales. Although the occurrence of sei whales is documented off Costa Rica (Rodriguez-Herrera *et al.,* 2002), the reliability of the identification is uncertain. Neither Ferguson and Barlow (2001) or Jackson *et al.* (2008) positively identified sei whales in or near the proposed project area during surveys conducted during July–December. Similarly, Rasmussen *et al.* (2004) did not report sei whales in 8 years of surveys off Costa Rica or Panama. No sei whales were detected during L–DEO seismic surveys off Costa Rica or Nicaragua in November–December 2004 or February–March 2008 (Holst *et al.,* 2005b; Holst and Smultea, 2008), in the Hess Deep approximately 1100 km (683.5 mi) west of the Galapagos Islands in July 2003 (Smultea and Holst, 2003), or 1600–1950 km (994.2–1211.7 mi) west of the proposed survey area in April–August 2008 (Hauser *et al.,* 2008).

No confirmed fin whale sightings were made in the proposed study area during 10 years of survey effort in July–December by Ferguson and Barlow (2001) or by Jackson *et al.* (2008) during July–December surveys in 2006. Despite >30 years of NMFS and other surveys, as well as stranding records from the Pacific coast of Costa Rica, there have been no confirmed records of fin whales (May-Collado *et al.,* 2005). A possible sighting of a fin whale in this region occurred off the Osa Peninsula in 1997; however, the sighting was not confirmed (May-Collado *et al.,* 2005), although Rodriguez-Herrera *et al.* (2002) list the fin whale as having been documented off Costa Rica. No fin whales were detected during L–DEO seismic surveys off Costa Rica or Nicaragua in November–December 2004 or February–March 2008 (Holst *et al.,* 2005b; Holst and Smultea, 2008), in the Hess Deep approximately 1100 km (683.5 mi) west of the Galapagos Islands in July 2003 (Smultea and Holst, 2003), or 1600–1950 km (994.2–1211.7 mi) west of the proposed survey area in April–August 2008 (Hauser *et al.,* 2008). Sei and fin whales are not considered further in this document.

The general distribution of minke whales (*Balaenoptera acutorostrata*) includes the offshore waters of the study area (Reeves *et al.,* 2002). However, minke whales are likely to be rare in the survey area. This species has been found off the coast of Costa Rica on occasion (Rodriguez-Herrera *et al.,* 2002). No minke whales were found in the proposed project region during July–December surveys during 1986–1996 by Ferguson and Barlow (2001) or in 2006 by Jackson *et al.* (2008). Rasmussen *et al.* (2004) did not report seeing any minke whales in 8 years of surveys (1996–2003) off Costa Rica or in 2001–2003 off Panama. May-Collado *et al.* (2005) also did not report any minkes based on compiled sightings off Costa Rica during 1979–2001, nor have minkes been reported among compiled strandings off Costa Rica (Rodriguez-Fonseca and Cubero-Pardo, 2001). Minke whales are unlikely to occur in the planned survey areas and are not considered further in this document.

Longman's beaked whale (*Indopacetus pacificus*), also known as the tropical bottlenose whale, is considered rare in the ETP. Although widespread throughout the tropical Pacific, the species is considered rare because of a scarcity of sightings despite a great deal of survey effort (Pitman *et al.,* 1999). In the ETP, most tropical bottlenose whale sightings have been made between 3–10° N (Pitman *et al.,* 1999). Kinzey *et al.* (2001) reported one sighting of *I. pacificus* in the ETP at about 135° W. Jackson *et al.* (2008) also reported *I. pacificus* in the ETP well to the west of the proposed study area. No Longman's beaked whales were reported by May-Collado *et al.* (2005) based on compiled sightings off Costa Rica from 1979–2001. The species is very rare in the study area and is not considered further in this document.

Dwarf (*Kogia sima*) and pygmy (*K. breviceps*) sperm whales may occur in the proposed survey area, although dwarf sperm whales are likely to be very rare and pygmy sperm whales are likely to be rare. No *Kogia* sp. were detected during L–DEO seismic surveys off Costa Rica and Nicaragua in November–December 2004 (Holst *et al.,* 2005b) or in the Hess Deep approximately 1100 km (683.5 mi) west of the Galapagos Islands in July 2003 (Smultea and Holst, 2003). One sighting of a dwarf sperm whale and one sighting of two pygmy sperm whales were observed off the coast of Costa Rica in waters approximately 2000 m (6561.7 ft) and 3500 m (11482.9 ft) deep, respectively, during an L–DEO seismic survey off Costa Rica and Nicaragua in February–March 2008 (Holst and Smultea, 2008), and one unidentified *Kogia* sp. was sighted during L–DEO seismic surveys 1600–1950 km (994.2–1211.7 mi) west of the proposed survey area in April–August 2008 (Hauser *et al.,* 2008). Due to the rarity of these species, no take has been requested and none will be authorized.

Six species of pinnipeds are known to occur in the ETP: The Guadalupe fur seal (*Arctocephalus townsendi*), California sea lion (*Zalophus californianus*), Galapagos sea lion (*Z. wollebaeki*), Galapagos fur seal (*A. galapagoensis*), southern sea lion (*Otaria flavescens*), and the South American fur seal (*A. australis*). Ranges of the first two are substantially north of the proposed seismic survey areas, and the last four species are not expected to occur in the offshore waters of the study areas. The marine sea otter, which is managed by the U.S. Fish and Wildlife Service, is a coastal species and does not occur in offshore waters. Pinnipeds are highly unlikely to occur in the survey area and are not considered in further detail here.

The ETP is a biologically productive area that supports a variety of cetacean species (Au and Perryman, 1985). Several studies of marine mammal distribution and abundance have been conducted in the wider ETP. The most extensive regional distribution and abundance data that encompass the study area come primarily from multi-year vessel surveys conducted in the wider ETP by the NMFS Southwest Fisheries Science Center (SWFSC). Information on the distribution of cetaceans inhabiting the ETP has been summarized in several studies (Polacheck, 1987; Wade and Gerrodette, 1993; Ferguson and Barlow, 2001; Gerrodette *et al.,* 2008). However, for some species, abundance in the proposed seismic survey area could be quite different from that of the wider ETP, depending on local oceanographic variability.

In addition, procedures used during the various surveys that are cited have differed somewhat, and those differences could affect the results. For example, Ferguson and Barlow (2001) calculated cetacean densities in the ETP based on summer/fall research surveys in 1986–1996. Their densities are corrected for both changes in detectability of species with distance from the survey track line and for perception and availability bias. Gerrodette *et al.* (2008) calculated dolphin abundance in the ETP based on summer/fall research surveys in 1986–1990, 1998–2000, 2003, and 2006. Their estimates are corrected for the former but not the latter.

Additional sighting records are available from recent surveys in the ETP. Jackson *et al.* (2008) described cetacean sightings data collected during a survey from July 28–December 7, 2006. The survey area extended from 30° N–18° S from the coastline to 153° W, overlapping with the proposed seismic survey area. Rasmussen *et al.* (2004) and Calambokidis *et al.* (2010) described cetacean sightings resulting from humpback whale surveys off Costa Rica and surrounding waters from January to March in 1996–2003 and 2010. Recent at-sea monitoring for L–DEO in the ETP also provided sighting records for cetaceans during seismic programs. Seismic monitoring programs took place at the Hess Deep in July 2003, approximately 1100 km (683.5 mi) west of the Galapagos Islands (Smultea and Holst, 2003); from Costa Rica to El Salvador in November–December 2004, mainly within approximately 100 km (62.1 mi) of the coast in water depths extending to 5000 m (16,404.2 ft) (Holst *et al.,* 2005b); from Costa Rica to Nicaragua in March–April 2008, up to approximately 200 km (124.3 mi) from the coast in water depths extending to 5000 m (Holst and Smultea, 2008); and approximately 1600–1900 km (994.2–1,180.6 mi) west of the study area in April–August 2008 (Hauser *et al.,* 2008).

Information on the occurrence, distribution, population size, and conservation status for each of the 23 cetacean species that may occur in the proposed project area during October–November is presented in Table 2 in this document. The five species of marine mammals expected to be most common in the waters of the project area, all delphinids, include the short beaked common dolphin (*Delphinus delphis*), pantropical spotted dolphin (*Stenella attenuata*), bottlenose dolphin (*Tursiops truncatus*), Risso's dolphin (*Grampus griseus*), and short-finned pilot whale (*Globicephala macrorhynchus*). Additional information regarding the abundance and distribution, population status, and life history and behavior of these species expected to be found in the project area and how the estimated densities were calculated may be found in SIO's application. NMFS has reviewed these data and determined them to be the best available scientific information for the purposes of the proposed IHA. Please refer to the application for that information (*see* **ADDRESSES**). Additional information can also be found in the NMFS Stock Assessment Report (SAR). The Pacific 2009 SAR is available at: *http://www.nmfs.noaa.gov/pr/pdfs/sars/po2009.pdf.*

TABLE 2—THE OCCURRENCE, HABITAT, REGIONAL ABUNDANCE, CONSERVATION STATUS, AND BEST AND MAXIMUM DENSITY ESTIMATES FOR MARINE MAMMALS IN OR NEAR THE PROPOSED LOW-ENERGY SEISMIC SURVEY AREA IN THE EASTERN TROPICAL PACIFIC OCEAN. CETACEAN DENSITIES ARE BASED ON NMFS SWFSC SHIP TRANSECT SURVEYS CONDUCTED IN 1986–2006 FROM PREDICTIVE MODELING (BARLOW ET AL. 2009; READ ET AL. 2009) OR IN 1986–1996 FROM FERGUSON AND BARLOW (2003)

[*See* text and Tables 2–4 in SIO's application for further detail.]

Species	Occurrence in survey area during Oct–Nov	Habitat	Regional population size [1]	ESA [2]	Density (best) [3]	Density (max) [4]
Mysticetes:						
Bryde's Whale, (*Balaenoptera edeni*)	Uncommon	Pelagic and coastal	13,000 [5]	NL	0.53	1.15
Blue whale, (*Balaenoptera musculus*)	Uncommon	Pelagic and coastal	1415 [6]	EN	0.13	0.23
Humpback whale, (*Megaptera novaeangliae*).	Uncommon	Mainly nearshore waters and banks.	NE Pacific 1392 [13]; SE Pacific 2900 [14].	EN	[15] 0.1	[15] 0.2
Odontocetes:						
Sperm whale, (*Physeter macrocephalus*).	Common	Usually deep pelagic, steep topography.	26,053 [7]	EN	3.95	15.20
Pygmy sperm whale, (*Kogia breviceps*)	Rare	Deep waters off shelf.	NA [8]	NL	[16] 0.01	[16] 0.02
Dwarf sperm whale, (*Kogia sima*)	Very rare	Deep waters off shelf.	11,200 [9]	NL	[16] 0.01	[16] 0.02
Cuvier's beaked whale, (*Ziphius cavirostris*).	Common	Slope and pelagic	20,000 [6]	NL	1.83	3.70
Blainville's beaked whale, (*Mesoplodon densirostris*).	Uncommon	Pelagic	25,300 [10]	NL	[17] 0.21	[17] 0.37
Pygmy beaked whale, (*Mesoplodon peruvianus*).	Uncommon	Pelagic	25,300 [10]	NL	[17] 0.21	[17] 0.37
Gingko-toothed beaked whale, (*Mesoplodon stejnegeri*).	Very rare	Pelagic	25,300 [10]	NL	[17] 0.21	[17] 0.37
Bottlenose dolphin, (*Tursiops truncatus*).	Very common	Coastal, shelf, pelagic.	335,834	NL	15.14	23.09
Rough-toothed dolphin, (*Steno bredanensis*).	Common	Mainly pelagic	107,633	NL	1.60	2.34
Short-beaked common dolphin, (*Delphinus delphis*).	Very common	Shelf, pelagic, high relief.	3,127,203	NL	143.21	242.80
Pantropical spotted dolphin, (*Stenella attenuata*).	Very common	Coastal and pelagic	857,884	NL	12.43	22.53
Risso's dolphin, (*Grampus griseus*)	Very common	Shelf, slope, seamounts.	110,457	NL	10.21	37.40
Spinner dolphin, (*Stenella longirostris*)	Very common	Coastal and pelagic	1,797,716	NL	3.81	5.74
Striped dolphin, (*Stenella coeruleoalba*)	Very common	Off continental shelf	964,362	NL	35.23	53.67
Fraser's dolphin, (*Lagenodelphis hosei*)	Common	Pelagic	289,300 [6]	NL	1.03	5.60
Melon-headed whale, (*Peponocephala electra*).	Common	Pelagic	45,400 [6]	NL	2.80	9.30
Pygmy killer whale, (*Feresa attenuata*)	Uncommon	Pelagic	38,900 [6]	NL	0.60	1.80
False killer whale, (*Pseudorca crassidens*).	Uncommon	Pelagic	39,800 [6]	NL	0.39	2.10
Killer whale, (*Orcinus orca*)	Uncommon	Widely distributed	8,500 [11]	NL	0.85	4.00

TABLE 2—THE OCCURRENCE, HABITAT, REGIONAL ABUNDANCE, CONSERVATION STATUS, AND BEST AND MAXIMUM DENSITY ESTIMATES FOR MARINE MAMMALS IN OR NEAR THE PROPOSED LOW-ENERGY SEISMIC SURVEY AREA IN THE EASTERN TROPICAL PACIFIC OCEAN. CETACEAN DENSITIES ARE BASED ON NMFS SWFSC SHIP TRANSECT SURVEYS CONDUCTED IN 1986–2006 FROM PREDICTIVE MODELING (BARLOW ET AL. 2009; READ ET AL. 2009) OR IN 1986–1996 FROM FERGUSON AND BARLOW (2003)—Continued

[*See* text and Tables 2–4 in SIO's application for further detail.]

Species	Occurrence in survey area during Oct–Nov	Habitat	Regional population size [1]	ESA [2]	Density (best) [3]	Density (max) [4]
Short-finned pilot whale, (*Globicephala macrorhynchus*).	Common	Mostly pelagic, high-relief.	589,315 [12]	NL	6.29	11.74

NA—Data not available or species status was not assessed. For density estimates, NA indicates that estimates would be lower than the lowest estimate in this table.
[1] Abundance from Gerrodette *et al.* (2008) unless otherwise stated.
[2] U.S. Endangered Species Act: EN = Endangered, T = Threatened, NL = Not listed.
[3] Best density (#/1000km^2) estimate as listed in Table 3 of the application. Cetecean densities are based on NMFS SWFSC ship transect surveys conducted in 1986–2006 from predictive modeling (Barlow *et al.* 2009; Read *et al.* 2009) or in 1986–1996 from Ferguson and Barlow (2003).
[4] Maximum density (#/1000km^2) estimate as listed in Table 3 of the application.
[5] This estimate is mainly for *Balaenoptera edeni* but may include some *B. borealis.*
[6] ETP (Wade and Gerrodette 1993).
[7] Eastern temperate North Pacific (Whitehead 2002).
[8] California/Oregon/Washington (Carretta *et al.* 2010).
[9] This abundance estimate is mostly for *Kogia sima* but may also include some *K. breviceps.* Density estimates for *Kogia* spp. combined.
[10] Estimates for population size and for density include all species of the genus *Mesoplodon* in the ETP (Ferguson and Barlow 2001).
[11] ETP (Ford 2002).
[12] This estimate is for *Globicephala macrorhynchus* and *G. melas* in the ETP (Gerrodette and Forcada 2002).
[13] U.S. west coast (Carretta *et al.* 2010).
[14] Southeast Pacific; Felix *et al.* (2005).
[15] Approximate estimates.
[16] Density estimates are combined for pygmy and dwarf sperm whales.
[17] Density estimates are combined for species of the genus *Mesoplodon.*

Marine Mammal Hearing

The primary effect on marine mammals anticipated from the specified activities will result from exposure of animals to underwater sound. Exposure to sound can affect marine mammal hearing. When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data, Southall *et al.* (2007) designate "functional hearing groups" for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (13 species of mysticetes): Functional hearing is estimated to occur between approximately 7 Hz and 22 kHz;
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): Functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (six species of true porpoises, four species of river dolphins, two members of the genus *Kogia,* and four dolphin species of the genus *Cephalorhynchus*): Functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in water: Functional hearing is estimated to occur between approximately 75 Hz and 75 kHz, with the greatest sensitivity between approximately 700 Hz and 20 kHz.

As mentioned previously in this document, 21 cetacean species are likely to occur in the proposed survey area. Of the 21 species likely to occur in SIO's project area, two are classified as low frequency cetaceans (Bryde's, humpback, and blue whales) and 18 are classified as mid-frequency cetaceans (sperm, Cuvier's beaked, Blainville's beaked, pygmy beaked, gingko-toothed beaked, melon-headed, pygmy killer, false killer, killer, and short-finned pilot whales and rough-toothed, bottlenose, pantropical spotted, spinner, striped, Fraser's, short-beaked common, and Risso's dolphins) (Southall *et al.,* 2007).

Potential Effects of the Specified Activity on Marine Mammals

Potential Effects of Airguns

The effects of sounds from airguns might result in one or more of the following: Tolerance, masking of natural sounds, behavioral disturbances, temporary or permanent hearing impairment, and 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, or PTS, in the unlikely event that it occurred, would constitute injury, but temporary threshold shift (TTS) is not an injury (Southall *et al.,* 2007). It is unlikely that the project would result in any cases of temporary or especially permanent hearing impairment or any significant non-auditory physical or physiological effects for reasons discussed later in this document. Some behavioral disturbance is expected, but it is expected that this would be localized and short-term because of the short amount of time that would be spent at any particular site within the survey area (approximately two days of seismic data acquisition at any one site).

(1) Tolerance

Numerous studies have shown that pulsed sounds from airguns are often readily detectable in the water at distances of many kilometers. For a brief summary of the characteristics of airgun pulses, *see* Appendix A(3) of the supporting EA (*see* **ADDRESSES**). However, it should be noted that most of the measurements are for airguns that would be detectable considerably farther away than the GI airgun planned for use in the present project.

Several studies have shown that marine mammals at distances more than a few kilometers from operating seismic vessels often show no apparent response; *see* Appendix A(5) of the EA. That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of the mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to airgun pulses under some conditions, at other times, mammals of all three types have shown no overt reactions. In general, pinnipeds usually seem to be more tolerant of exposure to airgun pulses than are cetaceans, with the relative responsiveness of baleen and toothed whales being variable. Given the relatively small and low-energy GI airgun source planned for use in this project, mammals are expected to tolerate being closer to this source than would be the case for a larger airgun source typical of most seismic surveys.

(2) Masking

Obscuring of sounds of interest by interfering sounds, generally at similar frequencies, is known as masking. Masking effects of pulsed sounds (even from large arrays of airguns, much larger than that proposed for use in this survey) on marine mammal calls and other natural sounds are expected to be limited, although there are few specific data of relevance. Because of the intermittent nature and low duty cycle of seismic pulses, animals can emit and receive sounds in the relatively quiet intervals between pulses. However, in some situations, multi-path arrivals and reverberation cause airgun sound to arrive for much or all of the interval between pulses (Simard *et al.,* 2005; Clark and Gagnon, 2006), which could mask calls. Whale calls often can be heard between the seismic pulses (Richardson *et al.,* 1986; McDonald *et al.,* 1995; Greene *et al.,* 1999a,b; Nieukirk *et al.,* 2004; Smultea *et al.,* 2004; Holst *et al.,* 2005a,b, 2006; Dunn and Hernandez, 2009), and certain baleen and toothed whales are known to continue calling in the presence of seismic pulses. However, Clark and Gagnon (2006) reported that fin whales in the northeast Pacific Ocean went silent for an extended period starting soon after the onset of a seismic survey in the area. Similarly, there has been one report that sperm whales ceased calling when exposed to pulses from a very distant seismic ship (Bowles *et al.,* 1994). However, more recent studies found that sperm whales continued calling in the presence of seismic pulses (Madsen *et al.,* 2002; Tyack *et al.,* 2003; Smultea *et al.,* 2004; Holst *et al.,* 2006; Jochens *et al.,* 2008). Given the small source planned for use during the proposed survey, there is even less potential for masking of baleen or sperm whale calls during the present study than in most seismic surveys. Masking effects of seismic pulses are expected to be negligible in the case of small odontocetes, given the intermittent nature of seismic pulses. Dolphins and porpoises commonly are heard calling while airguns are operating (Gordon *et al.,* 2004; Smultea *et al.,* 2004; Holst *et al.,* 2005a,b; Potter *et al.,* 2007). The sounds important to small odontocetes are predominantly at much higher frequencies than are the dominant components of airgun sounds, thus limiting the potential for masking. In general, masking effects of seismic pulses are expected to be minor, given the normally intermittent nature of seismic pulses. Masking effects on marine mammals are discussed further in Appendix A(4) of the EA.

(3) Disturbance Reactions

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement. Reactions to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors (Richardson *et al.,* 1995; Wartzok *et al.,* 2004; Southall *et al.,* 2007; Weilgart, 2007). If a marine mammal responds to an underwater sound by changing its behavior or moving a small distance, the response may or may not rise to the level of "taking", or affect the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on animals or on the stock or species could potentially be significant (Lusseau and Bejder, 2007; Weilgart, 2007). Given the many uncertainties in predicting the quantity and types of impacts of noise on marine mammals, it is common practice to estimate how many mammals are likely to be present within a particular distance of a given activity, or exposed to a particular level of sound. This practice potentially overestimates the numbers of marine mammals that are affected in some biologically-important manner.

The sound exposure thresholds that are used to estimate how many marine mammals might be harassed by a seismic survey are based on behavioral observations during studies of several species. However, information is lacking for many species. Detailed studies have been done on humpback, gray (*Eschrichtius robustus*), bowhead (*Balaena mysticetus*), and sperm whales, and on ringed seals (*Phoca hispida*). Less detailed data are available for some other species of baleen whales, small toothed whales, and sea otters, but for many species there are no data on responses to marine seismic surveys. Most of those studies have concerned reactions to much larger airgun sources than planned for use in the proposed SIO project. Thus, effects are expected to be limited to considerably smaller distances and shorter periods of exposure in the present project than in most of the previous work concerning marine mammal reactions to airguns.

Baleen Whales—Baleen whales generally tend to avoid operating airguns, but avoidance radii are quite variable. Whales are often reported to show no overt reactions to pulses from large arrays of airguns at distances beyond a few kilometers, even though the airgun pulses remain well above ambient noise levels out to much longer distances. However, as reviewed in Appendix A(5) of the EA, baleen whales exposed to strong noise pulses from airguns often react by deviating from their normal migration route (Richardson *et al.,* 1999) and/or interrupting their feeding activities and moving away from the sound source. In the cases of migrating gray and bowhead whales, the observed changes in behavior appeared to be of little or no biological consequence to the animals. They simply avoided the sound source by displacing their migration route to varying degrees, but within the natural boundaries of the migration corridors (Schick and Urban, 2000; Richardson *et al.,* 1999; Malme *et al.,* 1983).

Studies of gray, bowhead, and humpback whales have shown that seismic pulses with received levels of pulses in the 160–170 dB re 1 μPa (rms) range seem to cause obvious avoidance behavior in a substantial fraction of the animals exposed (Richardson *et al.,* 1995). In many areas, seismic pulses from large arrays of airguns diminish to those levels at distances ranging from 4.5–14.5 km (2.8–9 mi) from the source. A substantial proportion of the baleen whales within those distances may show avoidance or other strong disturbance reactions to the airgun array. Subtle behavioral changes sometimes become evident at somewhat lower received levels, and studies summarized in Appendix A(5) of the EA have shown that some species of baleen whales, notably bowhead and humpback whales, at times show strong avoidance at received levels lower than 160–170 dB re 1 μPa (rms). Reaction distances would be considerably smaller during the proposed project, for which the 160 dB radius is predicted to be 400 m (1312.3 ft) (*see* Table 1 in this document), as compared with several kilometers when a large array of airguns is operating.

Responses of humpback whales to seismic surveys have been studied during migration, on summer feeding grounds, and on Angolan winter breeding grounds; there has also been discussion of effects on the Brazilian wintering grounds. McCauley *et al.* (1998, 2000a) studied the responses of humpback whales off Western Australia to a full-scale seismic survey with a 16-airgun, 2678-in^3 array, and to a single 20-in^3 airgun with a source level of 227 dB re 1 μPa-m peak-to-peak. McCauley *et al.* (1998) documented that initial avoidance reactions began at 5–8 km (3.1–5 mi) from the array, and that those reactions kept most pods approximately 3–4 km (1.9–2.5 mi) from the operating seismic boat. McCauley *et al.* (2000a) noted localized displacement during migration of 4–5 km (2.5–3.1 mi) by traveling pods and 7–12 km (4.3–7.5 mi) by cow-calf pairs. Avoidance distances with respect to the single airgun were smaller but consistent with the results from the full array in terms of received sound levels. The mean received level for initial avoidance reactions to an approaching airgun was 140 dB re 1 μPa (rms) for humpback whale pods containing females. The standoff range, *i.e.,* the mean closest point of approach of the whales to the airgun, corresponded to a received level of 143 dB re 1 μPa (rms). The initial avoidance response generally occurred at distances of 5–8 km (3.1–5.0 mi) from the airgun array and 2 km (1.2 mi) from the single airgun. However, some individual humpback whales, especially males, approached within distances of 100–400 m (328.1–1312.3 ft), where the maximum received level was 179 dB re 1 μPa (rms).

Humpback whales on their summer feeding grounds in southeast Alaska did not exhibit persistent avoidance when exposed to seismic pulses from a 100-in^3 airgun (Malme *et al.,* 1985). Some humpbacks seemed "startled" at received levels of 150–169 dB re 1 μPa on an (approximate) rms basis. Malme *et al.* (1985) concluded that there was no clear evidence of avoidance, despite the possibility of subtle effects, at received levels up to 172 re 1 μPa on an (approximate) rms basis.

It has been suggested that South Atlantic humpback whales wintering off Brazil may be displaced or even strand upon exposure to seismic surveys (Engel *et al.,* 2004). The evidence for this was circumstantial and subject to alternative explanations (IAGC 2004). Also, the evidence was not consistent with subsequent results from the same area of Brazil (Parente *et al.,* 2006), or with results from direct studies of humpback whales exposed to seismic surveys in other areas and seasons. After allowance for data from subsequent years, there was "no observable direct correlation" between strandings and seismic surveys (IWC 2007).

Studies of bowhead whales show that their responsiveness can be quite variable depending on the activity (*e.g.,* migrating vs. feeding). Bowhead whales migrating west across the Alaskan Beaufort Sea in autumn, in particular, are unusually responsive, with substantial avoidance occurring out to distances of 20–30 km (12.4–18.6 mi) from a medium-sized airgun source at received sound levels of around 120–130 dB re 1 μPa (rms) (Miller *et al.,* 1999; Richardson *et al.,* 1999; *see also* Appendix A (5) of the EA). However, more recent research on bowhead whales (Miller *et al.,* 2005; Harris *et al.,* 2007) corroborates earlier evidence that, during the summer feeding season, bowheads are not as sensitive to seismic sources. Nonetheless, subtle but statistically significant changes in surfacing-respiration-dive cycles were evident upon statistical analysis (Richardson *et al.,* 1986). In summer, bowheads typically begin to show avoidance reactions at received levels of about 152–178 dB re 1 μPa (rms) (Richardson *et al.,* 1986, 1995; Ljungblad *et al.,* 1988; Miller *et al.,* 2005).

Reactions of migrating and feeding (but not wintering) gray whales to seismic surveys have been studied. Malme *et al.* (1986, 1988) studied the responses of feeding Eastern Pacific gray whales to pulses from a single 100-in^3 airgun off St. Lawrence Island in the northern Bering Sea. They estimated, based on small sample sizes, that 50 percent of feeding gray whales ceased feeding at an average received pressure level of 173 dB re 1 μPa on an (approximate) rms basis and that 10 percent of feeding whales interrupted feeding at received levels of 163 dB re 1 μPa (rms). Those findings were generally consistent with the results of experiments conducted on larger numbers of gray whales that were migrating along the California coast (Malme *et al.,* 1984; Malme and Miles, 1985) and with observations of Western Pacific gray whales feeding off Sakhalin Island, Russia, when a seismic survey was underway just offshore of their feeding area (Wursig *et al.,* 1999; Gailey *et al.,* 2007; Johnson *et al.,* 2007; Yazvenko *et al.,* 2007a,b), along with data on gray whales off British Columbia (Bain and Williams, 2006). Gray whales typically show no conspicuous responses to airgun pulses with received levels up to 150 to 160 dB re 1 μPa (rms), but are increasingly likely to show avoidance as received levels increase above that range. While neither bowhead nor gray whales are present in the study area, these studies can be used to draw general inference about the potential reactions of other baleen whales to underwater sound.

Various species of the genus *Balaenoptera* (*e.g.,* blue, sei, fin, Bryde's, and minke whales) have occasionally been reported in areas ensonified by airgun pulses (Stone, 2003; MacLean and Haley, 2004; Stone and Tasker, 2006), and calls from blue and fin whales have been localized in areas with airgun operations (McDonald *et al.,* 1995; Dunn and Hernandez, 2009). Sightings by observers on seismic vessels off the United Kingdom from 1997–2000 suggest that, at times of good sightability, sighting rates for mysticetes (mainly fin and sei whales) were similar when large arrays of airguns were shooting and not shooting (Stone, 2003; Stone and Tasker, 2006). However, these whales tended to exhibit localized avoidance, remaining significantly further (on average) from the airgun array during seismic operations compared with non-seismic periods (Stone and Tasker, 2006). In a study off Nova Scotia, Moulton and Miller (2005) found little difference in sighting rates (after accounting for water depth) and initial sighting distances of balaenopterid whales when airguns were operating vs. silent. However, there were indications that these whales were more likely to be moving away when seen during airgun operations. Similarly, ship-based monitoring studies of blue, fin, sei, and minke whales offshore of Newfoundland (Orphan Basin and Laurentian Sub-basin) found no more than small differences in sighting rates and swim direction during seismic vs. non-seismic periods (Moulton *et al.,* 2005, 2006a,b).

Data on short-term reactions, or lack thereof, by cetaceans to impulsive noises do not necessarily provide information about long-term effects. It is not known whether impulsive noises affect reproductive rate or distribution and habitat use in subsequent days or years. However, gray whales continued to migrate annually along the west coast of North America with substantial increases in the population over recent years, despite intermittent seismic exploration (and much ship traffic) in that area for decades (*see* Appendix A in Malme *et al.,* 1984; Richardson *et al.,* 1995; Angliss and Allen, 2009). The Western Pacific gray whale population did not seem affected by a seismic survey in its feeding ground during a prior year (Johnson *et al.,* 2007). Bowhead whales have continued to travel to the eastern Beaufort Sea each summer, and their numbers have increased notably (3.4 percent annually for nearly a decade), despite seismic exploration in their summer and autumn range for many years (Richardson *et al.,* 1987; Angliss and Allen 2009). In any event, brief exposures to sound pulses from the proposed airgun source are highly unlikely to result in prolonged effects.

Toothed Whales—Little systematic information is available about reactions of toothed whales to noise pulses. Few studies similar to the more extensive baleen whale/seismic pulse work summarized above have been reported for toothed whales. However, systematic studies on sperm whales have been done (Gordon *et al.,* 2006; Madsen *et al.,* 2006; Winsor and Mate, 2006; Jochens *et al.,* 2008; Miller *et al.,* 2009), and there is an increasing amount of information about responses of various odontocetes to seismic surveys based on monitoring studies (Stone 2003; Smultea *et al.,* 2004; Moulton and Miller, 2005; Bain and Williams, 2006; Holst *et al.,* 2006; Stone and Tasker, 2006; Potter *et al.,* 2007; Hauser *et al.,* 2008; Holst and Smultea, 2008; Weir, 2008; Barkaszi *et al.,* 2009; Richardson *et al.,* 2009).

Seismic operators and PSOs on seismic vessels regularly see dolphins and other small toothed whales near operating airgun arrays, but, in general, there seems to be a tendency for most delphinids to show some avoidance of operating seismic vessels (Goold, 1996a,b,c; Calambokidis and Osmek, 1998; Stone, 2003; Moulton and Miller, 2005; Holst *et al.,* 2006; Stone and Tasker, 2006; Weir, 2008; Richardson *et al.,* 2009; *see also* Barkaszi *et al.,* 2009). Some dolphins seem to be attracted to the seismic vessel and floats, and some ride the bow wave of the seismic vessel even when large airgun arrays are firing (Moulton and Miller, 2005). Nonetheless, there have been indications that small toothed whales sometimes tend to head away, or to maintain a somewhat greater distance from the vessel, when a large array of airguns is operating than when it is silent (Stone and Tasker, 2006; Weir, 2008). In most cases, the avoidance radii for delphinids appear to be small, on the order of 1 km (0.62 mi) or less, and some individuals show no apparent avoidance. The beluga whale (*Delphinapterus leucas*) is a species that (at least at times) shows long-distance avoidance of seismic vessels. Aerial surveys conducted during seismic operations in the southeastern Beaufort Sea during summer recorded much lower sighting rates of beluga whales within 10–20 km (6.2–12.4 mi) compared with 20–30 km (12.4–18.6 mi) from an operating airgun array, and observers on seismic boats in that area rarely see beluga whales (Miller *et al.,* 2005; Harris *et al.,* 2007). However, beluga whales are not found in SIO's proposed project area.

Captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong pulsed sounds similar in duration to those typically used in seismic surveys (Finneran *et al.,* 2000, 2002, 2005). The animals tolerated high received levels of sound before exhibiting aversive behaviors.

Most studies of sperm whales exposed to airgun sounds indicate that this species shows considerable tolerance of airgun pulses (Stone, 2003; Moulton *et al.,* 2005, 2006a; Stone and Tasker, 2006; Weir, 2008). In most cases the whales do not show strong avoidance and continue to call (*see* Appendix A of the EA for review). However, controlled exposure experiments in the Gulf of Mexico indicate that foraging effort is somewhat altered upon exposure to airgun sound (Jochens *et al.,* 2008; Miller *et al.,* 2009; Tyack, 2009).

There are almost no specific data on the behavioral reactions of beaked whales (Family Ziphiidae) to seismic surveys. However, northern bottlenose whales (*Hyperoodon ampullatus*) continued to produce high-frequency clicks when exposed to sound pulses from distant seismic surveys (Gosselin and Lawson, 2004; Laurinolli and Cochrane, 2005; Simard *et al.,* 2005). Most beaked whales tend to avoid approaching vessels of other types (Wursig *et al.,* 1998). They may also dive for an extended period when approached by a vessel (Kasuya, 1986), although it is uncertain how much longer such dives may be as compared to dives by undisturbed beaked whales, which also are often quite long (Baird *et al.,* 2006; Tyack *et al.,* 2006). In any event, it is likely that most beaked whales would also show strong avoidance of an approaching seismic vessel, although this has not been documented explicitly.

Odontocete reactions to large arrays of airguns are variable and, at least for delphinids and Dall's porpoises, seem to be confined to a smaller radius than has been observed for the more responsive of the mysticetes, beluga whales, and harbor porpoises (Appendix A of the EA).

Additional details on the behavioral reactions (or the lack thereof) by all types of marine mammals to seismic vessels can be found in Appendix A (5) of the EA.

(4) Hearing Impairment and Other Physical Effects

Temporary (TTS) or permanent (PTS) hearing impairment is a possibility when marine mammals are exposed to very strong sounds. TTS has been demonstrated and studied in certain captive odontocetes and pinnipeds exposed to strong sounds (reviewed in Southall *et al.,* 2007). However, there has been no specific documentation of this for marine mammals exposed to sequences of airgun pulses.

Several aspects of the planned monitoring and mitigation measures for this project (*see* the "Proposed Mitigation" and "Proposed Monitoring and Reporting" sections later in this document) are designed to detect marine mammals occurring near the airguns to avoid exposing them to sound pulses that might, at least in theory, cause hearing impairment. In addition, many cetaceans are likely to show some avoidance of the area where received levels of airgun sound are high enough that hearing impairment could potentially occur. In those cases, the avoidance responses of the animals themselves will reduce or (most likely) avoid any possibility of hearing impairment.

Non-auditory physical effects may also occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that theoretically might occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. It is possible that some marine mammal species (*i.e.,* beaked whales) may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds. However, as discussed later in this document, there is no definitive evidence that any of these effects occur even for marine mammals in close proximity to large arrays of airguns. It is especially unlikely that any effects of these types would occur during the present project given the brief duration of exposure for any given individual and the planned monitoring and mitigation measures (*see* the "Proposed Mitigation" and "Proposed Monitoring and Reporting" sections later in this document). The following subsections discuss in somewhat more detail the possibilities of TTS, permanent threshold shift (PTS), and non-auditory physical effects.

Temporary Threshold Shift—TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. At least in terrestrial mammals, TTS can last from minutes or hours to (in cases of strong TTS) days. For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the noise ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall *et al.,* (2007). The distances from the *Melville's* airguns at which the received energy level (per pulse, flat-weighted) that would be expected to be greater than or equal to 180 dB re 1 μPa are estimated in Table 1.

Given the available data, the received level of a single seismic pulse (with no frequency weighting) might need to be approximately 186 dB re 1 μPa^2-s (*i.e.,* 186 dB sound exposure level (SEL) or approximately 221–226 dB pk-pk) in order to produce brief, mild TTS. Exposure to several strong seismic pulses that each have received levels near 190 dB re 1 μPa (rms) (175–180 dB SEL) might result in cumulative exposure of approximately 186 dB SEL and thus slight TTS in a small odontocete, assuming the TTS threshold is (to a first approximation) a function of the total received pulse energy. Levels ≥190 dB re 1 μPa (rms) are expected to be restricted to radii no more than 15 m (49.2 ft) from the *Melville'*s GI airguns. For an odontocete closer to the surface, the maximum radius with ≥190 dB re 1 μPa (rms) would be smaller.

The above TTS information for odontocetes is derived from studies on the bottlenose dolphin and beluga whale. There is not published TTS information for other species of cetaceans. However, preliminary evidence from a harbor porpoise exposed to airgun sound suggests that its TTS threshold may have been lower (Lucke *et al.,* 2009).

For baleen whales, there are no data, direct or indirect, on levels or properties for any sound source required to induce TTS. The frequencies to which baleen whales are most sensitive are lower than those for odontocetes, and natural background noise levels at those low frequencies tend to be higher. Marine mammals can hear sounds at varying frequency levels. However, sounds that are produced in the frequency range at which an animal hears the best do not need to be as loud as sounds in less functional frequencies to be detected by the animal. As a result, auditory thresholds of baleen whales within their frequency band of best hearing are believed to be higher (less sensitive) than are those of odontocetes at their best frequencies (Clark and Ellison, 2004), meaning that baleen whales require sounds to be louder (*i.e.,* higher dB levels) than odontocetes in the frequency ranges at which each group hears the best. From this, it is suspected that received levels causing TTS onset may also be higher in baleen whales (Southall *et al.,* 2007). Since current NMFS practice assumes the same thresholds for the onset of hearing impairment in both odontocetes and mysticetes, the threshold is likely conservative for mysticetes. In any event, no cases of TTS are expected given two considerations: (1) The small size of the GI airgun source (a total discharge volume of approximately 90 in^3 as opposed to arrays of much larger volumes up to 6,600 in^3); and (2) the strong likelihood that baleen whales would avoid the approaching airguns (*i.e.,* the vessel) before being exposed to levels high enough for TTS to possibly occur (as discussed previously in this document).

As noted above, most cetacean species tend to avoid operating airguns, although not all individuals do so. In addition, ramping up airgun arrays, which is standard operational protocol for large airgun arrays and proposed for the much smaller airgun array for this action, should allow cetaceans to move away from the seismic source and avoid being exposed to the full acoustic output of the airgun array. Even with a large airgun array, it is unlikely that the cetaceans would be exposed to airgun pulses at a sufficiently high level for a sufficiently long period to cause more than mild TTS, given the relative movement of the vessel and the marine mammal. The potential for TTS is much lower in this project because of the much smaller airgun array proposed to be used. With a large array of airguns, TTS would be most likely in any odontocetes that bow-ride or otherwise linger near the airguns. While bow-riding, odontocetes would be at or above the surface, and thus not exposed to strong pulses given the pressure-release effect at the surface. However, bow-riding animals generally dive below the surface intermittently. If they did so while bow-riding near airguns, they would be exposed to strong sound pulses, possibly repeatedly. If some cetaceans did incur TTS through exposure to airgun sounds, this would very likely be mild, temporary, and reversible.

To avoid the potential for injury, NMFS has determined that cetaceans should not be exposed to pulsed underwater noise at received levels exceeding 180 dB re 1 μPa (rms). As summarized above, data that are now available imply that TTS is unlikely to occur unless odontocetes (and probably mysticetes as well) are exposed to airgun pulses stronger than 180 dB re 1 μPa (rms).

Permanent Threshold Shift—When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter, 1985).

There is no specific evidence that exposure to pulses of airgun sound can cause PTS in any marine mammal, even with large arrays of airguns. However, given the possibility that mammals close to an airgun array might incur TTS, there has been further speculation about the possibility that some individuals occurring very close to airguns might incur PTS (Richardson *et al.,* 1995, Gedamke *et al.,* 2008). Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals. PTS might occur at a received sound level at least several decibels above that inducing mild TTS if the animal were exposed to strong sound pulses with rapid rise time (*see* Appendix A (6) of the EA). Based on data from terrestrial mammals, a precautionary assumption is that the PTS threshold for impulse sounds (such as airgun pulses as received close to the source) is at least 6 dB higher than the TTS threshold on a peak-pressure basis and probably > 6 dB (Southall *et al.,* 2007). On an SEL basis, Southall *et al.,*

(2007) estimated that received levels would need to exceed the TTS threshold by at least 15 dB for there to be risk of PTS. Thus, for cetaceans, Southall *et al.* estimate that the PTS threshold might be an M-weighted SEL (for the sequence of received pulses) of approximately 198 dB re 1 μPa^2-s (15 dB higher than the TTS threshold for an impulse).

Southall *et al.* (2007) also note that, regardless of the SEL, there is concern about the possibility of PTS if a cetacean or pinniped receives one or more pulses with peak pressure exceeding 230 or 218 dB re 1 μPa (peak), respectively. A peak pressure of 230 dB re 1 μPa (3.2 bar -m, 0-pk) would only be found within a meter from a GI gun, which has a peak pressure of 224.6 dB re 1μPa-m. A peak pressure of 218 dB re 1 μPa could be received somewhat farther away; to estimate that specific distance, one would need to apply a model that accurately calculates peak pressures in the near-field around an array of airguns. However, no pinnipeds are expected in the proposed survey areas.

Given the higher level of sound necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur. Baleen whales generally avoid the immediate area around operating seismic vessels, as do some other marine mammals.

Non-auditory Physiological Effects—Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.,* 2006; Southall *et al.,* 2007). Studies examining such effects are limited. However, resonance (Gentry 2002) and direct noise-induced bubble formation (Crum *et al.,* 2005) are not expected in the case of an impulsive source like an airgun array. If seismic surveys disrupt diving patterns of deep diving species, this might perhaps result in bubble formation and a form of "the bends," as speculated to occur in beaked whales exposed to sonar. However, there is no specific evidence of this upon exposure to airgun pulses.

In general, little is known about the potential for seismic survey sounds to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al.,* 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in those ways. Marine mammals that show behavioral avoidance of seismic vessels, including most baleen whales, some odontocetes, and some pinnipeds, are especially unlikely to incur auditory impairment or non-auditory physical effects.

(5) Strandings and Mortality

Marine mammals close to underwater detonations of high explosives can be killed or severely injured, and their auditory organs are especially susceptible to injury (Ketten *et al.,* 1993; Ketten, 1995). However, explosives are no longer used for marine seismic research or commercial seismic surveys and have been replaced entirely by airguns or related non-explosive pulse generators. Airgun pulses are less energetic and have slower rise times, and there is no specific evidence that they can cause injury, death, or stranding even in the case of large airgun arrays. However, the association of mass strandings of beaked whales with naval exercises and, in one case, an L–DEO seismic survey (Malakoff, 2002; Cox *et al.,* 2006) has raised the possibility that beaked whales exposed to strong "pulsed" sounds may be especially susceptible to injury and/or behavioral reactions that can lead to stranding (Hildebrand, 2005; Southall *et al.,* 2007). Appendix A (6) of the EA provides additional details.

Specific sound-related processes that lead to strandings and mortality are not well documented, but may include: (1) Swimming in avoidance of a sound into shallow water; (2) a change in behavior (such as a change in diving behavior) that might contribute to tissue damage, gas bubble formation, hypoxia, cardiac arrhythmia, hypertensive hemorrhage or other forms of trauma; (3) a physiological change such as a vestibular response leading to a behavioral change or stress-induced hemorrhagic diathesis, leading in turn to tissue damage; and (4) tissue damage directly from sound exposure, such as through acoustically-mediated bubble formation and growth or acoustic resonance of tissues. As noted in SIO's application, some of these mechanisms are unlikely to apply in the case of impulse sounds. However, there are increasing indications that gas-bubble disease (analogous to "the bends"), induced in super-saturated tissue by a behavioral response to acoustic exposure, could be a pathologic mechanism for the strandings and mortality of some deep-diving cetaceans exposed to sonar. The evidence for this remains circumstantial and associated with exposure to naval mid-frequency sonar, not seismic surveys (Cox *et al.,* 2006; Southall *et al.,* 2007).

Seismic pulses and mid-frequency sonar pulses are quite different, and some mechanisms by which sonar sounds have been hypothesized to affect beaked whales are unlikely to apply to airgun pulses. Sounds produced by airgun arrays are broadband impulses with most of the energy below 1 kHz. Typical military mid-frequency sonars operate at frequencies of 2–10 kHz, generally with a relatively narrow bandwidth at any one time. A further difference between seismic surveys and naval exercises is that naval exercises can involve sound sources on more than one vessel. Thus, it is not appropriate to assume that there is a direct correlation between the effects of military sonar and those of seismic surveys on marine mammals. However, evidence that sonar pulses can, in special circumstances, lead (at least indirectly) to physical damage and mortality (Balcomb and Claridge, 2001; NOAA and USN, 2001; Jepson *et al.,* 2003; Fernandez *et al.,* 2004, 2005; Hildebrand, 2005; Cox *et al.,* 2006) suggests that caution is warranted when dealing with exposure of marine mammals to any high-intensity pulsed sound.

There is no conclusive evidence of cetacean strandings or deaths at sea as a result of exposure to seismic surveys, but a few cases of strandings in the general area where a seismic survey was ongoing have led to speculation concerning a possible link between seismic surveys and strandings. Suggestions that there was a link between seismic surveys and strandings of humpback whales in Brazil (Engel *et al.,* 2004) were not well founded based on available data (IAGC, 2004; IWC, 2007). In September 2002, there was a stranding of two Cuvier's beaked whales (*Ziphius cavirostris*) in the Gulf of California, Mexico, when the L–DEO vessel R/V *Maurice Ewing* was operating a 20-airgun, 8490-in^3 array in the general area. The link between the stranding and the seismic surveys was inconclusive and not based on any physical evidence (Hogarth, 2002; Yoder, 2002). Nonetheless, the Gulf of California incident plus the beaked whale strandings near naval exercises involving use of mid-frequency sonar suggests a need for caution when conducting seismic surveys in areas occupied by beaked whales until more is known about effects of seismic surveys on those species (Hildebrand, 2005). No injuries of beaked whales are anticipated during the proposed study because of (1) the high likelihood that any beaked whales nearby would avoid the approaching vessel before being exposed to high sound levels, and (2) differences between the sound sources operated by SIO and those involved in the naval exercises associated with strandings.

Potential Effects of Other Acoustic Devices

(1) Multi-Beam Echosounder Signals

The Kongsberg EM 122 12-kHz MBES will be operated from the source vessel at some times during the planned study. Information about this equipment was provided earlier in this document. Any given mammal at depth near the trackline would be in the main beam for only one or two of the segments. Also, marine mammals that encounter the Kongsberg EM 122 are unlikely to be subjected to repeated pulses because of the narrow fore-aft width of the beam and will receive only limited amounts of pulse energy because of the short pulses. Animals close to the ship (where the beam is narrowest) are especially unlikely to be ensonified for more than one 2–15 ms pulse or 100-ms chirp (or two pulses or chirps if in the overlap area). Similarly, Kremser *et al.* (2005) noted that the probability of a cetacean swimming through the area of exposure when an MBES emits a pulse is small. The animal would have to pass the transducer at close range and be swimming at speeds similar to the vessel in order to receive the multiple pulses that might result in sufficient exposure to cause TTS.

Navy sonars that have been linked to avoidance reactions and stranding of cetaceans generally have longer pulse durations than the Kongsberg EM 122 and are often directed close to horizontally vs. more downward for the MBES. The area of possible influence of the MBES is much smaller—a narrow band below the source vessel. The duration of exposure for a given marine mammal can be much longer for Navy sonar. During SIO's operations, the individual pulses will be very short, and a given mammal would not receive many of the downward-directed pulses as the vessel passes by. Possible effects of an MBES on marine mammals are outlined below.

Marine mammal communications will not be masked appreciably by the MBES signals given the low duty cycle of the echosounder and the brief period when an individual mammal is likely to be within its beam. Furthermore, in the case of baleen whales, the echosounder signals (12 kHz) do not overlap with the predominant frequencies in the calls, which would avoid any significant masking.

Behavioral reactions of free-ranging marine mammals to sonars, echosounders, and other sound sources appear to vary by species and circumstance. Observed reactions have included silencing and dispersal by sperm whales (Watkins *et al.,* 1985), increased vocalizations and no dispersal by pilot whales (*Globicephala* spp.) (Rendell and Gordon, 1999), and the previously-mentioned beachings by beaked whales. During exposure to a 21–25 kHz "whale-finding" sonar with a source level of 215 dB re 1 µPa-m, gray whales reacted by orienting slightly away from the source and being deflected from their course by approximately 200 m (656.2 ft) (Frankel, 2005). When a 38-kHz echosounder and a 150-kHz acoustic Doppler current profiler were transmitting during studies in the ETP, baleen whales showed no significant responses, while spotted (*Stenella* spp.) and spinner (*Stenella longirostris*) dolphins were detected slightly more often and beaked whales less often during visual surveys (Gerrodette and Pettis, 2005).

Captive bottlenose dolphins and a beluga whale exhibited changes in behavior when exposed to 1-s tonal signals at frequencies similar to those that will be emitted by the MBES used by SIO, and to shorter broadband pulsed signals. Behavioral changes typically involved what appeared to be deliberate attempts to avoid the sound exposure (Schlundt *et al.,* 2000; Finneran *et al.,* 2002; Finneran and Schlundt, 2004). The relevance of those data to free-ranging odontocetes is uncertain, and in any case, the test sounds were quite different in duration as compared with those from an MBES.

Given recent stranding events that have been associated with the operation of naval sonar, there is concern that mid-frequency sonar sounds can cause serious impacts to marine mammals (*see* above). However, the MBES proposed for use by SIO is quite different than sonar used for Navy operations. Pulse duration of the MBES is very short relative to naval sonar. Also, at any given location, an individual marine mammal would be in the beam of the MBES for much less time given the generally downward orientation of the beam and its narrow fore-aft beamwidth; Navy sonar often use near-horizontally directed sound. Those factors would all reduce the sound energy received from the MBES relative to that from the sonar used by the Navy.

As noted earlier in this document, animals are unlikely to be exposed to levels that would result in TTS or Level B harassment because of the shape of the beam, the duration of the signal, and the likelihood that they will be avoiding the vessel at greater horizontal distance when airguns are operating.

(2) Sub-Bottom Profiler Signals

A SBP will be operated from the source vessel during the planned study. Details about this equipment were provided earlier in this document. The SBP on the *Melville* has a maximum source level of 211 dB re 1 µPa-m. Kremser *et al.* (2005) noted that the probability of a cetacean swimming through the area of exposure when a bottom profiler emits a pulse is small, and—even for an SBP more powerful than those on the *Melville*—if the animal was in the area, it would have to pass the transducer at close range in order to be subjected to sound levels that could cause TTS.

Marine mammal communications will not be masked appreciably by the SBP signals given their directionality and the brief period when an individual mammal is likely to be within their beams. Furthermore, in the case of most baleen whales, the SBP signals do not overlap with the predominant frequencies in the calls, which would avoid significant masking.

Marine mammal behavioral reactions to other pulsed sound sources were discussed previously, and responses to the SBP are likely to be similar to those for other pulsed sources if received at the same levels. However, the pulsed signals from the SBPs are considerably weaker than those from the MBES. Therefore, behavioral responses are not expected unless marine mammals are within 10 m of the source, which is not expected to occur.

The source levels of the SBP are much lower than those of the airguns. It is unlikely that the SBP produces pulse levels strong enough to cause hearing impairment or other physical injuries even in an animal that is (briefly) in a position near the source. The SBP is usually operated simultaneously with other higher-power acoustic sources. Many marine mammals will move away in response to the approaching higher-power sources or the vessel itself before the mammals would be close enough for there to be any possibility of effects from the less intense sounds from the SBP. Because of the shape of the beams of these sources and their power, NMFS believes it unlikely that marine mammals will be exposed to either the MBES or the SBP at levels at or above those likely to cause harassment. Further, NMFS believes that the brief exposure of cetaceans to a few signals from the multi-beam bathymetric sonar system is not likely to result in the harassment of marine mammals.

As stated above, current NMFS practice assumes that the onset of Level A harassment corresponds to 180 dB re 1 μPa (rms) for cetaceans. The precautionary nature of these criteria is discussed in Appendix A (5) of the supporting EA, including the fact that the minimum sound level necessary to cause permanent hearing impairment is higher, by a variable and generally unknown amount, than the level that induces barely-detectable TTS, and the level associated with the onset of TTS is often considered to be a level below which there is no danger of permanent damage. NMFS also assumes that cetaceans or pinnipeds exposed to levels exceeding 160 dB re 1 μPa (rms) may experience Level B (behavioral) harassment.

Potential Effects on Marine Mammal Habitat

The proposed SIO seismic survey will not result in any permanent impact to habitats used by marine mammals or to their food sources, 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 further detail earlier in this document, as behavioral modification. The main impact issue associated with the proposed activity will be temporarily elevated noise levels and the associated direct effects on marine mammals, as described previously.

Effects on Fish and Invertebrates

The existing body of information on the impacts of seismic survey sound on marine fish and invertebrates is very limited. Furthermore, the available information on the impacts of seismic surveys on fish and invertebrates is from studies of individuals or portions of a population; there have been no studies at the population scale. Thus, available information provides limited insight on possible real-world effects at the ocean or population scale. This makes drawing conclusions about impacts problematic because ultimately, the most important aspect of potential impacts relates to how exposure to seismic survey sound affects populations and their viability, including their availability to fisheries. However, there is some unpublished and very limited evidence of the potential for adverse effects on fish and invertebrates, thereby justifying further discussion and analysis of this issue. The three types of potential effects of exposure to seismic surveys on fish and marine invertebrates are pathological, physiological, and behavioral.

Pathological effects involve lethal and temporary or permanent sublethal injury. Physiological effects involve temporary and permanent primary and secondary stress responses, such as changes in levels of enzymes and proteins. Behavioral effects refer to temporary and (if they occur) permanent changes in exhibited behavior (*e.g.,* startle and avoidance behavior). The three categories are interrelated in complex ways. For example, it is possible that certain physiological and behavioral changes potentially could lead to an ultimate pathological effect on individuals (*i.e.,* mortality). The specific received sound levels at which permanent adverse effects to fish potentially could occur are little studied and largely unknown.

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; *see also* Appendix D of the EA). More details concerning the effects of airguns on fish and invertebrates are included in SIO's application and the associated EA. In conclusion, NMFS has preliminarily determined that SIO's proposed seismic survey operations are not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or on the food sources they utilize.

Proposed Mitigation

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

Mitigation and monitoring measures proposed to be implemented for the proposed seismic survey have been developed and refined during previous SIO seismic studies and associated EAs, IHA applications, and IHAs. The mitigation and monitoring measures described herein represent a combination of procedures required by past IHAs for other similar projects and on best practices recommended in Richardson *et al.* (1995), Pierson *et al.* (1998), and Weir and Dolman (2007). The measures are described in detail below.

Mitigation measures proposed by SIO for adoption during the proposed survey include (1) visual monitoring by protected species observers (discussed later in this document), (2) establishment of an exclusion zone (EZ), (3) speed or course alteration, provided that doing so will not compromise operational safety requirements, (4) GI airgun shut down procedures, and (5) ramp-up procedures. Although power-down procedures are often standard operating practice for seismic surveys, they will not be used here because powering down from two airguns to one airgun would make only a small difference in the 180-dB safety radius. The difference is not enough to allow continued one-airgun operations if a mammal came within the safety radius for two airguns.

Exclusion Zones—As discussed previously in this document, NMFS has determined that for acoustic effects, using acoustic thresholds in combination with corresponding safety radii is an effective way to consistently apply measures to avoid or minimize the impacts of an action. Thresholds are used to establish a mitigation shut-down, or exclusion, zone, *i.e.,* if an animal enters an area calculated to be ensonified above the level of an established threshold, a sound source is shut down.

As a matter of past practice and based on the best available information at the time regarding the effects of marine sound, NMFS estimates that Level A harassment from acoustic sources may occur when cetaceans are exposed to levels above 180 dB re 1 μPa (rms) level. NMFS also considers 160 dB re 1 μPa (rms) as the criterion for estimating the onset of Level B harassment from acoustic sources producing impulse sounds, as in this seismic survey.

Empirical data concerning the 180- and 160-dB distances have been acquired based on measurements during the acoustic verification study conducted by L–DEO in the northern Gulf of Mexico from May 27–June 3, 2003 (Tolstoy *et al.,* 2004). The empirical data indicate that, for this survey, the assumed 180- and 160-dB radii are 40 m (131.2 ft) and 400 m (1312.3 ft), respectively (*see* Table 1 in this document).

Speed or Course Alteration—If a marine mammal is detected outside the EZ but is likely to enter it based on relative movement of the vessel and the animal, and if safety and scientific objectives allow, the vessel speed and/

or course will be adjusted to minimize the likelihood of the animal entering the EZ. In the event that safety and/or scientific objectives do not allow for alteration of speed and/or course as a needed mitigation measure, shut-down procedures will still be utilized (*see* below). Major course and speed adjustments are often impractical when towing long seismic streamers and large source arrays but are possible in this case because only a small source and short streamers will be used.

Shut-down Procedures—If a marine mammal is detected by PSOs outside the EZ but is likely to enter the EZ, and if the vessel's speed and/or course cannot be changed to avoid having the animal enter the EZ, the airgun array, MBES, and SBP will be shut down before the animal is within the EZ. Likewise, if a marine mammal is already within the EZ when first detected, the airgun array, MBES, and SBP will be shut down immediately. Following a shut down, seismic activity will not resume until the marine mammal has cleared the EZ. The animal will be considered to have cleared the EZ if it (a) is visually observed to have left the EZ, or (b) has not been seen within the EZ for 15 min in the case of small odontocetes, or has not been seen within the EZ for 30 min in the case of mysticetes and large odontocetes, including sperm and beaked whales.

Ramp-up Procedures—A ramp-up procedure will be followed when the GI airguns begin operating after a specified period without GI airgun operations. It is proposed that, for the present cruise, this period would be approximately 1–2 min. This period is based on the 180-dB radii for the GI airguns (*see* Table 1 in this document) in relation to the planned speed of the *Melville* while shooting. Ramp-up will begin with a single GI airgun (45 in^3). The second GI airgun (45 in^3) will be added after 5 min. During ramp up, the PSOs will monitor the exclusion zone, and, if marine mammals are sighted, a shut-down will be implemented as though both GI airguns were operational.

If the complete EZ has not been visible for at least 30 min prior to the start of operations in either daylight or nighttime, ramp-up will not commence. If one GI airgun has operated, ramp-up to full power will be permissible at night or in poor visibility on the assumption that marine mammals will be alerted to the approaching seismic vessel by the sounds from the single GI airgun and could move away if they choose. A ramp-up from a shut-down may occur at night, but only when the entire EZ is visible, and it has been determined from the pre-ramp up watch that the EZ is clear of marine mammals. Ramp-up of the GI airguns will not be initiated if a marine mammal is sighted within or near the applicable EZ during day or night.

NMFS has 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:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed 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 ITAs 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 proposed action area.

SIO proposes to sponsor marine mammal monitoring during the present project in order to implement the proposed mitigation measures that require real-time monitoring and to satisfy the anticipated monitoring requirements of the IHA. SIO's proposed Monitoring Plan is described next. The monitoring work described here has been planned as a self-contained project independent of any other related monitoring projects that may be occurring simultaneously in the same regions. SIO is prepared to discuss coordination of its monitoring program with any related work that might be done by other groups insofar as this is practical and desirable.

Vessel-based Visual Monitoring

Three protected species observers (PSOs) will be based aboard the seismic source vessel for the duration of the cruise and will watch for marine mammals near the vessel during daytime airgun operations and during start-up of airguns at any time. Watches will be conducted by at least one observer 100% of the time during seismic surveys in daylight hours. Daylight observation by at least one observer will continue during non-seismic periods, as long as weather conditions make observations meaningful, for comparison of sighting rates and animal behavior during periods with vs. without airgun operations. PSOs will be appointed by SIO with NMFS concurrence after a review of their qualifications.

The *Melville* is a suitable platform for marine mammal observations. The observer platform is located one deck below and forward of the bridge (12.46 meters (40.88 ft) above the waterline), affording a relatively unobstructed 180-degree forward view. Aft views can be obtained along the port and starboard decks. During daytime hours, the observer(s) will scan the area systematically using reticulated 25x150 big-eye binoculars and 7x50 hand-held binoculars to determine bearing and distance of sightings. A clinometer is used to determine distances of animals in close proximity to the vessel. Hand-held fixed rangefinders and distance marks on the ship's side rails are used to measure the exact location of the safety zone. Laser rangefinders, which have proven to be less reliable for open water sighting, are also provided. During darkness, night-vision equipment will be available. 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 advise promptly of the need for avoidance maneuvers or GI airgun shut down.

Before commencing seismic operations during daylight hours, two observers will maintain a 360-degree watch for all marine mammals for at least 30 minutes prior to the start of seismic operations after an extended shutdown of the airguns (1–2 minutes, depending on vessel speed). If no marine mammals are observed within the EZ during this time, the observers will notify the seismic personnel of an "all clear" status. Watch periods are scheduled as a 2-hour rotation. The observers continually scan the water from the horizon to the ship's hull, and forward of 90 degrees from the port and starboard beams. Based on PSO observations, the GI airgun will be shut down (as described earlier in this document) when marine mammals are detected within or about to enter a designated EZ that corresponds to the 180-dB re 1 μPa (rms) isopleths. The PSOs will continue to maintain watch to determine when the animal(s) are outside the EZ, and airgun operations will not resume until the animal has left that EZ. The predicted distance for the 180-dB EZ is listed in Table 1 earlier in this document. Seismic operations will resume only after the animals are seen to exit the safety radius or after no further visual detection of the animal for 15 minutes (for small odontocetes and pinnipeds) or 30 minutes (for mysticetes and large odontocetes, including beaked whales).

The bridge officers and other crew will be instructed to alert the observer on watch of any suspected marine mammal sighting. If needed, the bridge will be contacted in order to maneuver the ship to avoid interception with approaching marine mammals.

PSO Data and Documentation

PSOs will record data to estimate the numbers of marine mammals exposed to various received sound levels and to document 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 shutdown of the seismic source when a marine mammal is within or near the EZ. When a sighting is made, the following information about the sighting will be recorded:

• Species, group size, and age/size/sex categories (if determinable); behavior when first sighted and after initial sighting; heading (if consistent), bearing and distance from seismic vessel; sighting cue, apparent reaction to the seismic source or vessel (*e.g.,* none, avoidance, approach, paralleling, *etc.*); and behavioral pace; and

• Time, location, heading, speed, activity of the vessel, sea state, visibility, cloud cover, and sun glare.

The data will also be recorded at the start and end of each observation watch and during a watch whenever there is a change in one or more of the variables.

All observations, as well as information regarding seismic source shutdown, will be recorded in a standardized format. Data collection procedures are adapted from the line-transect protocols developed by the SWFSC for their marine mammal abundance research cruises. A laptop computer is located on the observer platform for ease of data entry. The computer is connected to the ship's Global Positioning System, which allows a record of time and position to be made at 3-minute intervals and for each event entered (such as sightings, weather updates and effort changes). Data accuracy will be verified by the PSOs at sea and preliminary reports will be prepared during the field program and summaries forwarded to the SIO's shore facility and to NSF weekly or more frequently. PSO observations will provide the following information:

• The basis for decisions about shutting down the airgun arrays;

• Information needed to estimate the number of marine mammals potentially 'taken by harassment', which will be reported to NMFS;

• Data on the occurrence, distribution, and activities of marine mammals in the area where the seismic study is conducted; and

• Data on the behavior and movement patterns of marine mammals seen at times with and without seismic activity.

A report will be submitted to NMFS within 90 days after the end of the cruise. The report will describe the operations that were conducted and sightings of marine mammals near the operations. The report will be submitted to NMFS, providing 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 amount and nature of potential "take" of marine mammals by harassment or in other ways. All injured or dead marine mammals (regardless of cause) will be reported to NMFS as soon as practicable. The report should include species or description of animal, condition of animal, location, time first found, observed behaviors (if alive), and photo or video, if available.

Estimated Takes by Incidental Harassment

With respect to the activities described 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].

All anticipated takes would be by Level B harassment, involving temporary changes in behavior. The proposed mitigation and monitoring measures are expected to minimize the possibility of injurious or lethal takes such that take by Level A harassment, serious injury or mortality is considered remote. However, as noted earlier, there is no specific information demonstrating that injurious or lethal "takes" would occur even in the absence of the planned mitigation and monitoring measures. The sections here describe methods to estimate "take by Level B harassment" and present estimates of the numbers of marine mammals that might be affected during the proposed seismic program. The estimates of "take" are based on data collected in the ETP by NMFS SWFSC during 12 ship-based cetacean and ecosystem assessment surveys conducted during July–December from 1986–2006.

It is assumed that, during simultaneous operations of the seismic sources and the other sources, any marine mammals close enough to be affected by the MBES or SBP would already be affected by the seismic sources. However, whether or not the seismic sources are operating simultaneously with the other sources, marine mammals are expected to exhibit no more than short-term and inconsequential responses to the MBES and SBP given their characteristics (*e.g.,* narrow downward-directed beam) and other considerations described above, such as the unlikelihood of being exposed to the source at higher levels and the fact that it would likely only be for one or two pulses. Such reactions are not considered to constitute "taking" (NMFS, 2001). Therefore, no additional allowance is included for animals that might be affected by sound sources other than the seismic sources (*i.e.,* air guns).

Extensive systematic ship-based surveys have been conducted by NMFS SWFSC for marine mammals in the ETP. SWFSC has recently developed habitat modeling as a method to estimate cetacean densities on a finer spatial scale than traditional line-transect analyses by using a continuous function of habitat variables, *e.g.,* sea surface temperature, depth, distance from shore, and prey density (Barlow *et al.,* 2009). The models have been incorporated into a Web-based Geographic Information System (GIS) developed by Duke University's Department of Defense Strategic Environmental Research and Development Program (SERDP) team in close collaboration with the SWFSC SERDP team (Read *et al.,* 2009). The GIS was used to obtain densities for the 11 cetaceans in the model (Bryde's whale, blue whale, *Kogia* spp., *Mesoplodon* spp., rough-toothed, bottlenose, pantropical spotted, spinner, striped, and short-beaked common dolphins, and short-finned pilot whale) in each of eight areas: the four proposed survey areas (*see* Figure 1 in SIO's application), and corridors 1° wide and centered on the tracklines between the survey areas and from the southernmost survey area to the EEZ of Peru. For species sighted in SWFSC surveys whose sample sizes were too small to model density (sperm whale, humpback whale, Cuvier's beaked whale, Fraser's dolphin, Risso's dolphin, melon-headed, pygmy killer, false killer, and killer whales), SIO used densities from the surveys conducted during summer and fall 1986–1996, as summarized by Ferguson and Barlow (2001). Densities were calculated from Ferguson and Barlow (2003) for 5° x 5° blocks that include the proposed survey areas and corridors. Those blocks included 27,275 km (16,947.9 mi) of survey effort in Beaufort sea states 0–5 and 2564 km (1593.2 mi) of survey effort in Beaufort sea states 0–2. Densities were obtained for an additional eight species that were sighted in one or more of those blocks.

Oceanographic conditions, including occasional El Nino and La Nina events, influence the distribution and numbers of marine mammals present in the ETP, resulting in considerable year-to-year variation in the distribution and abundance of many marine mammal species (Escorza-Trevino, 2009). Thus, for some species, the densities derived from recent surveys (*see* Table 2 of this document) may not be representative of the densities that will be encountered during the proposed seismic survey.

Table 3 in SIO's application gives the average (or "best") and maximum densities for each species of cetacean likely to occur in the study area, *i.e.,* species for which densities were obtained or assigned. These densities have been corrected for both detectability and availability bias by the study authors. Detectability bias is associated with diminishing sightability with increasing lateral distance from the trackline. Availability bias refers to the fact that there is less than 100 percent probability of sighting an animal that is present along the survey trackline.

The estimated numbers of individuals potentially exposed are presented next based on the 160-dB re 1 μPa (rms) Level B harassment criterion for all cetaceans. It is assumed that marine mammals exposed to airgun sounds at that level might change their behavior sufficiently to be considered "taken by harassment".

It should be noted that the following estimates of "takes by harassment" assume that the surveys will be undertaken and completed; in fact, the planned number of line-kilometers has been increased to accommodate lines that may need to be repeated, equipment testing, *etc.* As is typical on offshore ship surveys, inclement weather and equipment malfunctions are likely to cause delays and may limit the number of useful line-kilometers of seismic operations that can be undertaken. Furthermore, any marine mammal sightings within or near the designated EZ will result in the shutdown of seismic operations as a mitigation measure. Thus, the following estimates of the numbers of marine mammals potentially exposed to 160-dB re 1 μPa (rms) sounds are precautionary and probably overestimate the actual numbers of marine mammals that might be taken. These estimates assume that there will be no weather, equipment, or mitigation delays, which is highly unlikely.

There is some uncertainty about the representativeness of the data and the assumptions used in the calculations presented here. However, the approach used here is believed to be the best available approach. Also, to provide some allowance for these uncertainties, "maximum estimates" as well as "best estimates" of the densities present and numbers potentially affected have been derived. Best estimates of density are the mean densities weighted by effort in the eight survey areas or corridors from Read *et al.* (2009) or the nine 5° x 5° blocks from Ferguson and Barlow (2001, 2003), whereas maximum estimates of density are the highest densities in any of those survey areas/corridors or blocks.

The number of different individuals that may be exposed to GI airgun sounds with received levels ≥160 dB re 1 μPa (rms) on one or more occasions was estimated by considering the total marine area that would be within the 160-dB radius around the operating airgun array on at least one occasion, along with the expected density of animals in the area. The proposed seismic lines do not run parallel to each other in close proximity, which minimizes the number of times an individual mammal may be exposed during the survey; in this case, an individual could be exposed 1.01 times on average. The numbers of different individuals potentially exposed to ≥160 dB re 1 μPa (rms) were calculated by multiplying the expected species density, either "mean" (*i.e.,* best estimate) or "maximum", times the anticipated area to be ensonified to that level during GI airgun operations.

The area expected to be ensonified was determined by entering the planned survey lines into a MapInfo GIS, using the GIS to identify the relevant areas by "drawing" the applicable 160-dB buffer (*see* Table 1 in this document) around each seismic line, and then calculating the total area within the buffers. Areas where overlap occurred (because of intersecting lines) were included only once when estimating the number of individuals exposed.

Applying the approach described here, approximately 4340 km^2 (1675.7 mi^2) would be within the 160-dB isopleth on one or more occasions during the surveys. This approach does not allow for turnover in the mammal populations in the study area during the course of the survey. That might underestimate actual numbers of individuals exposed, although the conservative distances used to calculate the area may offset this. In addition, the approach assumes that no cetaceans will move away or toward the trackline as the *Melville* approaches in response to increasing sound levels prior to the time the levels reach 160 dB. Another way of interpreting the estimates that follow (Table 3 in this document) is that they represent the number of individuals that are expected (in the absence of a seismic program) to occur in the waters that will be exposed to ≥160 dB re 1 μPa (rms). The take estimates presented here do not take the proposed mitigation measures into consideration and thus are likely to be overestimates.

TABLE 3—THE ESTIMATES OF THE POSSIBLE NUMBERS OF MARINE MAMMALS EXPOSED TO SOUND LEVELS GREATER THAN OR EQUAL TO 160 dB DURING SIO'S PROPOSED SEISMIC SURVEY IN THE EASTERN TROPICAL PACIFIC OCEAN IN OCT–NOV 2010. THE PROPOSED SOUND SOURCE IS A PAIR OF GI AIRGUNS. RECEIVED LEVELS ARE EXPRESSED IN dB RE 1 μPA (RMS) (AVERAGED OVER PULSE DURATION), CONSISTENT WITH NMFS' PRACTICE. NOT ALL MARINE MAMMALS WILL CHANGE THEIR BEHAVIOR WHEN EXPOSED TO THESE SOUND LEVELS, BUT SOME MAY ALTER THEIR BEHAVIOR WHEN LEVELS ARE LOWER (SEE TEXT)

[*See* Tables 2–4 in SIO's Application for Further Detail]

Species	Number of individuals exposed (best) [1]	Number of individuals exposed (max) [1]	Approx. % regional population (best) [2]	Requested take authorization
Mysticetes:				
Bryde's whale, (*Balaenoptera edeni*)	3	6	0.02	3
Blue whale, (*Balaenoptera musculus*)	1	1	0.05	*2
Humpback whale, (*Megaptera novaeangliae*)	1	1	[3] NA	*2
Odontocetes:				
Sperm whale, (*Physeter macrocephalus*)	23	82	0.09	23
Cuvier's beaked whale, (*Ziphius cavirostris*)	10	20	0.05	10
Mesoplodon sp. (unidentified)	1	2	<0.01	1
Rough-toothed dolphin, (*Steno bredanensis*)	9	13	0.01	*15
Pantropical spotted dolphin, (*Stenella attenuata*)	67	122	0.01	*131
Spinner dolphin, (*Stenella longirostris*)	21	31	<0.01	*109
Bottlenose dolphin, (*Tursiops truncatus*)	82	125	0.02	82
Striped dolphin, (*Stenella coeruleoalba*)	6	291	<0.01	6
Fraser's dolphin, (*Lagenodelphis hosei*)	6	30	<0.01	*440
Short-beaked common dolphin, (*Delphinus delphis*)	777	1317	0.02	777
Pygmy killer whale, (*Feresa attenuata*)	3	10	0.01	*30
Melon-headed whale, (*Peponocephala electra*)	15	50	0.03	*258
Risso's dolphin, (*Grampus griseus*)	55	203	0.05	55
False killer whale, (*Pseudorca crassidens*)	2	11	0.01	*11
Killer whale, (*Orcinus orca*)	5	22	0.05	5
Short-finned pilot whale, (*Globicephala macrorhynchus*)	34	64	0.01	34

* Requested take authorization increased from 'best' exposure estimate to mean group size as reported in Ferguson *et al.* (2006).

[1] Best estimate and maximum estimate density are from Table 3 of SIO's application; therefore, takes are not anticipated for sei, fin, humpback, minke, Longman's beaked whales, pygmy sperm whales, and dwarf sperm whales. Humpback whale estimates calculated independently using methodology described previously.

[2] Regional population size estimates are from Table 2 in this document.

[3] Southern Hemisphere population sizes are poorly understood. However, the number of individuals potentially exposed is low relative to regional population.

Table 4 in SIO's application shows the best and maximum estimates of the number of exposures and the number of individual marine mammals that potentially could be exposed to ≥160 dB re 1 μPa (rms) during the seismic survey if no animals moved away from the survey vessel. Proposed take authorizations are based on best estimates, calculated according to the methodology described previously. The best estimate of the number of individual cetaceans that could be exposed to seismic sounds with received levels ≥160 dB re 1 μPa (rms) (but below Level A harassment thresholds) during the survey is shown in Table 4 of SIO's application and Table 3 here. That total includes 25 endangered whales: 1 blue whale (0.05% of the regional population), 1 humpback whale, and 23 sperm whales (0.09%). Percentage of regional population for humpback whale is not listed because Southern Hemisphere population numbers are poorly understood; however, the authorized take is low compared to regional population. It should be noted that the applicant did not initially request take authorization for humpback whales, believing that migrating individuals would depart the proposed study area prior to the activity dates. In subsequent discussions between NMFS and the applicant, it was agreed that there was some reasonable chance that late-migrant Southern Hemisphere individuals could be present in one or more of the study areas. The proposed take authorization for humpback whales reflects this decision. Most (96.8%) of the cetaceans potentially exposed are delphinids; short-beaked common, pantropical spotted, bottlenose, and Risso's dolphins and short-finned pilot whales are estimated to be the most common species in the area, with best estimates of 777 (0.02% of the regional population), 67 (0.01%), 82 (0.02%), 55 (0.05%), and 34 (0.01%) exposed to ≥160 dB re 1 μPa (rms), respectively. For certain species where the calculated number of individuals exposed was between 1 and the mean group size, the requested take authorization has been increased to the mean group size as observed in the ETP (Ferguson *et al.,* 2006).

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, intensity, and duration of Level B harassment; and (4) the context in which the take occurs.

NMFS has preliminarily determined that the impact of conducting the low-energy marine seismic survey in the ETP may result, at worst, in a temporary modification in behavior (Level B harassment) of small numbers of marine mammals. No mortality or injuries are anticipated as a result of the specified activity, and none are proposed to be authorized. Additionally, animals in the area are not expected to incur hearing impairment (*i.e.,* TTS or PTS) or non-auditory physiological effects. Due to the nature, degree, and context of behavioral harassment anticipated, the activity is not expected to impact rates of recruitment or survival. This activity is expected to result in a negligible impact on the affected species or stocks.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hr cycle). Behavioral reactions to noise exposure (such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Seismic operations are only scheduled to occur at each site for approximately 2 days. Additionally, the source vessel will be constantly moving and will not remain in any one spot for a prolonged period of time. Survey operations will be conducted solely in deep-water areas of no specifically-known (*e.g.,* breeding) importance for the species described.

Several species for which take authorization is requested are either ESA-listed and/or are considered "Depleted" under the MMPA. Blue, sperm, and humpback whales are listed as Endangered under the ESA (as well as MMPA–Depleted). Along the California coast blue whale abundance has been increasing during the past two decades (Calambokidis *et al.,* 1990; Barlow, 1994; Calambokidis, 1995). Though the magnitude of this apparent increase is too large to be accounted for by population growth alone and, therefore, is assumed to partly result from a shift in distribution, there is an apparent increasing trend. Some individuals from this stock may be present year-round on the Costa Rica Dome (Reilly and Thayer, 1990). Although the population in the North Pacific is expected to have grown since being given protected status in 1966, there is no evidence showing that the eastern North Pacific stock is currently growing, and no information exists on the rate of growth of blue whale populations in the Pacific (Best, 1993). Slightly more information is available for sperm whales, and it has been suggested that ETP animals of this species may form a distinct stock (Dufault and Whitehead 1995; Jaquet *et al.,* 2003). However, little is known about population trends and growth rates in the survey area. Again, populations are assumed to have increased since the species gained protection. Humpback whales potentially seen in the survey area would likely be late migrant individuals belonging to Southern Hemisphere stocks, where the International Whaling Commission has designated seven major breeding stocks linked to seven major feeding areas. In most areas for which there are good data, humpback whales have shown evidence of strong recovery towards their unexploited size, with annual increase rates of about 10% being recorded in a number of areas including off South America. The total Southern Hemisphere abundance is probably at least 60,000, although little data on which to base this number exists. The eastern spinner dolphin (*S. l. orientalis*), considered an offshore species and common in the survey area, is considered a Depleted stock under the MMPA. The long-term trend is flat for this stock. For all of these species, the levels of requested take are small relative to the regional population (*see* Table 3 in this document).

For reasons stated previously in this document, the negligible impact determination is also supported by the likelihood that, given sufficient "notice" through relatively slow ship speed, marine mammals are expected to move away from a noise source that is annoying prior to its becoming potentially injurious; the fact that cetaceans would have to be closer than 40 m (131.2 ft) in deep water when the GI airgun is in use from the vessel to be exposed to levels of sound (180 dB) believed to have even a minimal chance of causing PTS; and the likelihood that marine mammal detection ability by trained observers is high at that short distance from the vessel, enabling the implementation of shut-downs to avoid injury, serious injury, or mortality. As a result, no take by injury or death is anticipated, and the potential for temporary or permanent hearing impairment is very low and will be avoided through the incorporation of the proposed mitigation measures.

While the number of marine mammals potentially incidentally harassed will depend on the distribution and abundance of marine mammals in the vicinity of the survey activity, the number of potential harassment takings is estimated to be small, less than one percent of any of the estimated population sizes, and has been mitigated to the lowest level practicable through incorporation of the proposed mitigation and monitoring measures mentioned previously in this document.

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 preliminarily finds that the proposed SIO seismic survey will result in the incidental take of small numbers of marine mammal, by Level B harassment only, and that the total taking from the seismic survey will have a negligible impact on the affected species or stocks.

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

Subsistence whaling of several species of small cetaceans, including the bottlenose dolphin, takes place in territorial coastal waters of Peru (Read *et al.,* 1998). This hunt is mainly for human consumption and uses gill nets, purse seines, and harpoons. Read *et al.* (1998) estimated that approximately 10,000 dolphins and porpoises were landed in Peru in 1985. Because the seismic surveys are in offshore waters, the proposed activities will not have any impact on the availability of the species or stocks for subsistence users. However, there are no relevant subsistence uses of marine mammals implicated by this action.

Endangered Species Act (ESA)

There are six marine mammal species that are listed as endangered under the ESA with confirmed or possible occurrence in the study area: The humpback whale, South Pacific right whale, sei whale, fin whale, blue whale, and sperm whale. Under section 7 of the ESA, SIO has begun consultation with NMFS on the proposed seismic survey. NMFS will also consult internally on the issuance of an IHA under section 101(a)(5)(D) of the MMPA for this activity. As discussed previously in this document, take is requested only for species likely to occur in the survey area during the project timeframe (blue, humpback, and sperm whales), and consultation will consider these three species. Consultation will be concluded prior to a determination on the issuance of an IHA.

National Environmental Policy Act (NEPA)

On behalf of NSF, LGL Limited, Environmental Research Associates, prepared an EA titled "Environmental Assessment of a Marine Geophysical Survey by the R/V *Melville* in the Pacific

Ocean off Central and South America, October-November 2010". NMFS, after independently reviewing and evaluating the document for sufficiency and compliance with the Council on Environmental Quality regulations and NOAA Administrative Order 216–6, will either adopt NSF's EA or conduct a separate NEPA analysis, as necessary, prior to making a determination on the issuance of the IHA.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA for Level B harassment, at levels specified in Table 3 of this document, to SIO incidental to conducting a low-energy marine seismic survey in the ETP during the period October-November 2010, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: August 30, 2010.

James H. Lecky,

Director, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2010–22080 Filed 9–2–10; 8:45 am]

BILLING CODE 3510–22–P

COMMITTEE FOR PURCHASE FROM PEOPLE WHO ARE BLIND OR SEVERELY DISABLED

Procurement List Additions

AGENCY: Committee for Purchase From People Who Are Blind or Severely Disabled.

ACTION: Additions to the Procurement List.

SUMMARY: This action adds products and services to the Procurement List that will be furnished by nonprofit agencies employing persons who are blind or have other severe disabilities.

DATES: *Effective Date:* 10/4/2010.

ADDRESSES: Committee for Purchase From People Who Are Blind or Severely Disabled, Jefferson Plaza 2, Suite 10800, 1421 Jefferson Davis Highway, Arlington, Virginia 22202–3259.

FOR FURTHER INFORMATION CONTACT: Barry S. Lineback, Telephone: (703) 603–7740, Fax: (703) 603–0655, or e-mail *CMTEFedReg@AbilityOne.gov.*

SUPPLEMENTARY INFORMATION:

Additions

On 7/2/2010 (75 FR 38467–38468) and 7/9/2010 (75 FR 39497–39499), the Committee for Purchase From People Who Are Blind or Severely Disabled published Notices of proposed additions to the Procurement List.

Comments were received from a nonprofit agency that was not selected as the designated nonprofit agency to perform the Janitorial and Grounds Service at the Alan Bible Federal Building and Lloyd George U.S. Courthouse in Las Vegas, NV. In its comments, the nonprofit agency questions the fairness of the process used by the central nonprofit agency to identify the nonprofit agency to perform this project.

The Committee for Purchase From People Who Are Blind or Severely Disabled (Committee) operates pursuant to statutory and regulatory requirements. In accordance with these requirements, the Committee has designated central nonprofit agencies to perform certain duties, including facilitating the distribution of Government orders for goods and services among qualified nonprofit agencies. The central nonprofit agencies have established order distribution procedures which include dispute resolution processes. Accordingly, in this instance, if a qualified nonprofit agency questions the fairness of the order distribution process conducted by the central nonprofit agency, they must utilize the established dispute resolution process.

After consideration of the material presented to it concerning capability of qualified nonprofit agencies to provide the products and services and impact of the additions on the current or most recent contractors, the Committee has determined that the products and services listed below are suitable for procurement by the Federal Government under 41 U.S.C. 46–48c and 41 CFR 51–2.4.

Regulatory Flexibility Act Certification

I certify that the following action will not have a significant impact on a substantial number of small entities. The major factors considered for this certification were:

1. The action will not result in any additional reporting, recordkeeping or other compliance requirements for small entities other than the small organizations that will furnish the products and services to the Government.

2. The action will result in authorizing small entities to furnish the products and services to the Government.

3. There are no known regulatory alternatives which would accomplish the objectives of the Javits-Wagner-O'Day Act (41 U.S.C. 46–48c) in connection with the products and services proposed for addition to the Procurement List.

End of Certification

Accordingly, the following products and services are added to the Procurement List:

Products

NSN: 7220–00–NIB–0367—Disposable Urinal Floor Mat.
NSN: 7220–00–NIB–0368—Disposable Toilet Floor Mat.
NPA: NewView Oklahoma, Inc., Oklahoma City, OK.
Contracting Activity: GSA/Federal Acquisition Service, Fort Worth, TX.
Coverage: B-List for the Broad Government Requirement as aggregated by the General Services Administration.

NSN: 7520–01–377–9534—Cord Connector/Rotator, Telephone, Twisstop, Black.
NSN: 7520–00–NIB–2084—Shoulder Rest, Telephone, Black, Softak II.
NSN: 7520–00–NIB–2085—Shoulder Rest, Telephone, Black.
Coverage: A-List for the Total Government Requirement as aggregated by the General Services Administration.

NSN: 7520–01–253–1283—Shoulder Rest, Telephone, Beige, 2¼″ W × 7″ L.
NSN: 7520–01–377–9533—Cord Connector/Rotator, Telephone, Twisstop, Clear.
Coverage: B-List for the Broad Government Requirement as aggregated by the General Services Administration.
NPA: Bestwork Industries for the Blind, Inc., Runnemede, NJ.
Contracting Activity: GSA/Federal Acquisition Service, New York, NY.
NSN: 7910–00–NIB–0236—Surface Prep pad 13."
NSN: 7910–00–NIB–0240—Surface Prep pad 17."
NSN: 7910–00–NIB–0243—Surface Prep pad 20."
NPA: Beacon Lighthouse, Inc., Wichita Falls, TX.
Contracting Activity: Department of Veteran Affairs, National Acquisition Center, Hines, IL.

Coverage: C-List for 100% of the requirement of the Department of Veterans Affairs as aggregated by the Department of Veterans Affairs National Acquisition Center, Hines, IL.

NSN: 8415–00–NIB–0210—Pants, United States Coast Guard Running Suit, Size XS.
NSN: 8415–00–NIB–0778—Pants, United States Coast Guard Running Suit, Size SM.
NSN: 8415–00–NIB–0779—Pants, United States Coast Guard Running Suit, Size MD.
NSN: 8415–00–NIB–0780—Pants, United States Coast Guard Running Suit, Size LG.
NSN: 8415–00–NIB–0781—Pants, United States Coast Guard Running Suit, Size X–LG.
NSN: 8415–00–NIB–0782—Pants, United States Coast Guard Running Suit, Size XX–LG.
NPA: Association for the Blind & Visually Impaired & Goodwill Ind. of Greater Rochester, Rochester, NY.
Contracting Activity: Department of