DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA398

Marine Mammals; File No. 116–1691

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

ACTION: Notice; issuance of permit amendment.

SUMMARY: Notice is hereby given that Sea World LLC, Sea World of San Diego, 500 SeaWorld Drive, San Diego, California 92109 [Todd Robeck, D.V.M, PhD, Responsible Party and Principal Investigator (PI)] has been issued a minor amendment to Scientific Research Permit No. 116–1691–01.

ADDRESSES: The amendment and related documents are available for review upon written request or by appointment in the following offices:

Permits, Conservation and Education Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301) 713–2289; fax (301) 713–0376; and

Southwest Region, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, CA 90802–4213; phone (562) 980–4001; fax (562) 980–4018.

FOR FURTHER INFORMATION CONTACT: Jennifer Skidmore and Amy Sloan, (301) 713–2289.

SUPPLEMENTARY INFORMATION: The requested amendment has been granted under the authority of the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq.*) and the regulations governing the taking and importing of marine mammals (50 CFR part 216).

The original permit (No. 116–1691), issued on September 8, 2006 (71 FR 53089) authorized the permit holder to collect, receive, import, and export marine mammal specimens for scientific research purposes through August 31, 2011. The minor amendment (No. 116–1691–02) extends the duration of the permit through August 31, 2012, but does not change any other terms or conditions of the permit.

Dated: May 2, 2011.

P. Michael Payne,

Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2011–11149 Filed 5–5–11; 8:45 am]

BILLING CODE 3510–22–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA343

Takes of Marine Mammals Incidental to Specified Activities; Marine Geophysical Survey in the Western Gulf of Alaska, June to August, 2011

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 Lamont-Doherty Earth Observatory of Columbia University (L–DEO) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to conducting a marine geophysical survey in the western Gulf of Alaska (GOA), June to August, 2011. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to L–DEO to incidentally harass, by Level B harassment only, 16 species of marine mammals during the specified activity.

DATES: Comments and information must be received no later than June 6, 2011.

ADDRESSES: Comments on the application should be addressed to P. 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 *ITP.Goldstein@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.

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#applications* 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 above address, telephoning the contact listed here (see **FOR FURTHER INFORMATION CONTACT**) or visiting the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.*

The L–DEO, with support from the National Science Foundation (NSF), has prepared a draft "Environmental Assessment (EA) of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the western Gulf of Alaska, July-August 2011," prepared by LGL Ltd., Environmental Research Associates (LGL), on behalf of L–DEO, which is also available at the same internet address. Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Howard Goldstein or Jolie Harrison, Office of Protected Resources, NMFS, (301) 713–2289, ext. 172.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(D) of the MMPA (16 U.S.C. 1371 (a)(5)(D)) directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for the incidental taking of small numbers of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The authorization must set forth the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the mitigation, monitoring and reporting of such takings. NMFS has defined "negligible impact" in 50 CFR 216.103 as "* * * an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) of the MMPA establishes a 45-day time limit for NMFS' review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of small numbers of marine mammals. Within 45 days of the close of the public comment period, NMFS must either issue or deny the authorization.

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]."

Summary of Request

NMFS received an application on April 1, 2010, from L–DEO for the taking by harassment, of marine mammals, incidental to conducting a marine geophysical survey in the western GOA within the U.S. Exclusive Economic Zone (EEZ) in depths from approximately 25 meters (m) (82 feet [ft]) to greater than 6,000 m (19,685 ft). The cruise was postponed in 2010 and rescheduled for 2011. NMFS received a revised application on March 4, 2011 from L–DEO. L–DEO plans to conduct the proposed survey from approximately June 28 to August 4, 2011.

L–DEO plans to use one source vessel, the R/V *Marcus G. Langseth* (*Langseth*) and a seismic airgun array to collect seismic reflection and refraction profiles from the Shumagin Islands to east of Kodiak Island in the GOA. In addition to the proposed operations of the seismic airgun array, L–DEO intends to operate a multibeam echosounder (MBES) and a sub-bottom profiler (SBP) continuously throughout the survey.

Acoustic stimuli (*i.e.,* increased underwater sound) generated during the operation of the seismic airgun array may have the potential to cause a short-term behavioral disturbance for marine mammals in the survey area. This is the principal means of marine mammal taking associated with these activities and L–DEO has requested an authorization to take 16 species of marine mammals by Level B harassment. Take is not expected to result from the use of the MBES or SBP, for reasons discussed in this notice; nor is take expected to result from collision with the vessel because it is a single vessel moving at a relatively slow speed during seismic acquisition within the survey, for a relatively short period of time (approximately 38 days). It is likely that any marine mammal would be able to avoid the vessel.

Description of the Specified Activity

L–DEO's proposed seismic survey in the western GOA, from the Shumagin Islands to east of Kodiak Island, will take place during June to August, 2011, in the area 52.5° to 59° North, 147.5° to 161° West (see Figure 1 of the IHA application). The proposed seismic survey will take place in water depths ranging from 25 m (82 ft) to greater than 6,000 m (82 to 19,685 ft) and consists of approximately 2,553 kilometers (km) (1,378.5 nautical miles [nmi]) of transect lines in the study area. The project is scheduled to occur from approximately June 28 to August 4, 2011. Some minor deviation from these dates is possible, depending on logistics and weather.

The proposed seismic survey will collect seismic reflection and refraction data to characterize the subduction zone off southern Alaska, which produces large and destructive earthquakes. The data from this study will be used to: (1) Estimate the size of the seismogenic zone, the portion of the fault that controls the magnitude of earthquakes, and (2) provide critical information on how the properties of the seismogenic zone change along the subduction zone such that some areas produce large earthquakes and others do not. The proposed study focuses on the Semidi segment, whose earthquake recurrence interval is 50 to 75 years and which last ruptured in 1938.

The survey will involve one source vessel, the *Langseth.* The *Langseth* will deploy an array of 36 airguns as an energy source at a tow depth of 12 m (39.4 ft). The receiving system will consist of two 8 km (4.3 nmi) long hydrophone streamers and/or 21 ocean bottom seismometers (OBSs). As the airgun is towed along the survey lines, the hydrophone streamers will receive the returning acoustic signals and transfer the data to the on-board processing system. The OBSs record the returning acoustic signals internally for later analysis.

The planned seismic survey (*e.g.,* equipment testing, startup, line changes, repeat coverage of any areas, and equipment recovery) will consist of approximately 2,553 km of transect lines in the western GOA survey area (see Figure 1 of the IHA application). Just over half of the survey (1,363 km [736 nmi]) will take place in water deeper than 1,000 m; 30% or 754 km (407.1 nmi) will be surveyed in intermediate depth (100 to 1,000 m) water; and 17% (463 km [250 nmi]) will take place in water less than 100 m deep. Approximately 30 km (16.2 nmi) of seismic surveying will occur in water less than 40 m deep. A refraction survey using OBSs will take place along two lines (lines 3 and 5). Following the refraction survey, a multichannel (MCS) survey using two hydrophone streamers will take place along all of the transect lines. Thus, lines 3 and 5 will be surveyed twice. In addition to the operations of the airgun array, a Kongsberg EM 122 MBES and Knudsen 320B SBP will also be operated from the *Langseth* continuously throughout the cruise. There will be additional seismic operations associated with equipment testing, start-up, and possible line changes or repeat coverage of any areas where initial data quality is sub-standard. In L–DEO's calculations, 25% has been added for those additional operations.

All planned geophysical data acquisition activities will be conducted by L–DEO, the *Langseth's* operator, with on-board assistance by the scientists who have proposed the study. The Principal Investigators are Drs. Donna Shillington, Spahr Webb, and Mladen Nedimovic, all of L–DEO. The vessel will be self-contained, and the crew will live aboard the vessel for the entire cruise.

Vessel Specifications

The *Langseth,* owned by the National Science Foundation, will tow the 36 airgun array, as well as the hydrophone streamer, along predetermined lines. The *Langseth* will also deploy and retrieve the OBSs. When the *Langseth* is towing the airgun array and the hydrophone streamer, the turning rate of the vessel is limited to five degrees per minute. Thus, the maneuverability of the vessel is limited during operations with the streamer.

The vessel has a length of 71.5 m (235 ft); a beam of 17.0 m (56 ft); a maximum draft of 5.9 m (19 ft); and a gross tonnage of 3,834. The *Langseth* was designed as a seismic research vessel with a propulsion system designed to be as quiet as possible to avoid interference with the seismic signals emanating from the airgun array. The ship is powered by two 3,550 horsepower (hp) Bergen BRG–6 diesel engines which drive two propellers directly. Each propeller has four blades and the shaft typically rotates at 750 revolutions per minute. The vessel also has an 800 hp bowthruster, which is not used during seismic acquisition. The *Langseth's* operation speed during seismic acquisition is typically 7.4 to 9.3 km per hour (hr) (km/hr) (4 to 5 knots [kts]). When not towing seismic survey gear, the *Langseth* typically cruises at 18.5 km/hr (10 kts). The *Langseth* has a range of 25,000 km (13,499 nmi) (the distance the vessel can travel without refueling).

The vessel also has an observation tower from which protected species visual observers (PSVO) will watch for marine mammals before and during the proposed airgun operations. When stationed on the observation platform, the PSVO's eye level will be approximately 21.5 m (71 ft) above sea level providing the PSVO an unobstructed view around the entire vessel.

Acoustic Source Specifications

Seismic Airguns

The *Langseth* will deploy a 36 airgun array, with a total volume of approximately 6,600 cubic inches (in^3). The airgun array will consist of a mixture of Bolt 1500LL and Bolt 1900LLX airguns ranging in size from 40 to 360 in^3, with a firing pressure of 1,900 pounds per square inch. The airguns will be configured as four identical linear arrays or "strings" (see Figure 2 of the application). Each string will have 10 airguns, the first and last airguns in the strings are spaced 16 m (52 ft) apart. Of the 10 airguns, nine airguns in each string will be fired simultaneously, whereas the tenth is kept in reserve as a spare, to be turned on in case of failure of another airgun. The four airgun strings will be distributed across an area of approximately 24x16 m (78.7 × 52.5 ft) behind the *Langseth* and will be towed approximately 100 m (328 ft) behind the vessel. The shot interval will be relatively short, 50 m (164 ft) or approximately 22 seconds (s), for the MCS survey or reflection surveying and relatively longer, 280 m (918.6 ft) or approximately 120 s, when recording data on the OBSs during the refraction survey. The firing pressure of the array is 1,900 pounds per square inch (psi). During firing, a brief (approximately 0.1 s) pulse sound is emitted; the airguns will be silent during the intervening periods. The dominant frequency components range from two to 188 Hertz (Hz).

The tow depth of the array will be 12 m (39.4 ft) during OBS refraction and MCS surveys. Because the actual source is a distributed sound source (36 airguns) rather than a single point source, the highest sound measurable at any location in the water will be less than the nominal source level. In addition, the effective source level for sound propagating in near-horizontal directions will be substantially lower than the nominal source level applicable to downward propagation because of the directional nature of the sound from the airgun array.

Metrics Used in This Document

This section includes a brief explanation of the sound measurements frequently used in the discussions of acoustic effects in this document. Sound pressure is the sound force per unit area, and is usually measured in micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level (SPL) is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in underwater acoustics is 1 μPa, and the units for SPLs are dB re: 1 μPa. SPL (in decibels [dB]) = 20 log (pressure/reference pressure).

SPL is an instantaneous measurement and can be expressed as the peak, the peak-peak (p-p), or the root mean square (rms). Root mean square, which is the square root of the arithmetic average of the squared instantaneous pressure values, is typically used in discussions of the effects of sounds on vertebrates and all references to SPL in this document refer to the root mean square unless otherwise noted. SPL does not take the duration of a sound into account.

Characteristics of the Airgun Pulses

Airguns function by venting high-pressure air into the water which creates an air bubble. The pressure signature of an individual airgun consists of a sharp rise and then fall in pressure, followed by several positive and negative pressure excursions caused by the oscillation of the resulting air bubble. The oscillation of the air bubble transmits sounds downward through the seafloor and the amount of sound transmitted in the near horizontal directions is reduced. However, the airgun array also emits sounds that travel horizontally toward non-target areas.

The nominal source levels of the airgun arrays used by L–DEO on the *Langseth* are 236 to 265 dB re 1 μPa (p-p) and the rms value for a given airgun pulse is typically 16 dB re 1 μPa lower than the peak-to-peak value. However, the difference between rms and peak or peak-to-peak values for a given pulse depends on the frequency content and duration of the pulse, among other factors.

Accordingly, L–DEO has predicted the received sound levels in relation to distance and direction from the 36 airgun array and the single Bolt 1900LL 40 in^3 airgun, which will be used during power-downs. A detailed description of L–DEO's modeling for marine seismic source arrays for species mitigation is provided in Appendix A of L–DEO's EA. These are the nominal source levels applicable to downward propagation. The effective source levels for horizontal propagation are lower than those for downward propagation when the source consists of numerous airguns spaced apart from one another.

Appendix B of L–DEO's EA discusses the characteristics of the airgun pulses. NMFS refers the reviewers to the application and EA documents for additional information.

Predicted Sound Levels for the Airguns

Tolstoy *et al.,* (2009) reported results for propagation measurements of pulses from the *Langseth's* 36 airgun, 6,600 in^3 array in shallow-water (approximately 50 m [164 ft]) and deep-water depths (approximately 1,600 m [5,249 ft]) in the Gulf of Mexico in 2007 and 2008. L–DEO has used these reported and corrected empirical values to determine exclusion zones (EZs) for the 36 airgun array and modeled measurements for the single airgun; to designate EZs for purposes of mitigation, and to estimate take for marine mammals in the GOA.

Results of the Gulf of Mexico calibration study (Tolstoy *et al.,* 2009) showed that radii around the airguns for various received levels varied with water depth. Empirical measurements from the Gulf of Mexico were used for GOA and those measurements were used to determine the algorithm for the model. The empirical data for deep water (greater than 1,000 m; 3,280 ft) indicated that the L–DEO model (as applied to the *Langseth's* 36 airgun array) overestimated the received sound levels at a given distance. For intermediate depths, a correction of the empirical measurements for shallow and deep depths were made.

Using the corrected measurements (airgun array) or model (single airgun), Table 1 (below) shows the distances at which three rms sound levels are expected to be received from the 36 airgun array and a single airgun. The 180 and 190 dB re 1 μPa (rms) distances are the safety criteria for potential Level A harassment as specified by NMFS (2000) and are applicable to cetaceans and pinnipeds, respectively. If marine mammals are detected within or about to enter the appropriate EZ, the airguns will be powered-down (or shut-down, if necessary) immediately.

Table 1 summarizes the predicted distances at which sound levels (160, 180, and 190 dB [rms]) are expected to be received from the 36 airgun array and a single airgun operating in deep, intermediate, and shallow water depths.

TABLE 1—MEASURED (ARRAY) OR PREDICTED (SINGLE AIRGUN) DISTANCES TO WHICH SOUND LEVELS ≥ 190, 180, AND 160 DB RE: 1 μPA (RMS) COULD BE RECEIVED IN VARIOUS WATER DEPTH CATEGORIES DURING THE PROPOSED SURVEY IN THE WESTERN GOA, JUNE TO AUGUST, 2011.

Source and volume	Tow depth (m)	Water depth (m)	Predicted RMS radii distances (m)		
			190 dB	180 dB	160 dB
Single Bolt airgun (40 in^3)	6 to 12	Deep (> 1,000)	12	40	385
		Intermediate (100 to 1,000)	18	60	578
		Shallow (< 100)	150	296	1,050
4 Strings, 36 airguns (6,600 in^3).	12	Deep (> 1,000)	460	1,100	4,400
		Intermediate (100 to 1,000)	615	1,810	13,935
		Shallow (<100)	770	2,520	23,470

OBS Description and Deployment

The study will commence with a refraction survey using OBSs. Approximately 21 OBSs will be deployed by the *Langseth* at the beginning of the survey along one transect. After data are collected along this transect line, the OBSs will be picked up, and they will be re-deployed along the next refraction line. At the end of the refraction survey (approximately 3 days of seismic operations), all OBSs will be retrieved. OBS deployment is expected to take approximately 3 days, and OBS retrieval will take approximately 5 days.

Scripps Institution of Oceanography LC4x4 OBSs will be used during the cruise. This OBS has a volume of approximately 1 m^3, with an anchor that consists of a large piece of steel grating (approximately 1 m^2). Once an OBS is ready to be retrieved, an acoustic release transponder interrogates the OBS at a frequency of 9 to 11 kHz, and a response is received at a frequency of 9 to 13 kHz. The burn-wire release assembly is then activated, and the instrument is released from the anchor to float to the surface.

Along with the airgun operations, two additional acoustical data acquisition systems will be operated from the *Langseth* continuously during the survey. The ocean floor will be mapped with the Kongsberg EM 122 MBES and a Knudsen 320B SBP. These sound sources will be operated continuously from the *Langseth* throughout the cruise.

MBES

The *Langseth* will operate a Kongsberg EM 122 MBES concurrently during airgun operations to map characteristics of the ocean floor. The hull-mounted MBES emits brief pulses of sound (also called a ping) (10.5 to 13, usually 12 kHz) in a fan-shaped beam that extends downward and to the sides of the ship. The transmitting beamwidth is 1° or 2° fore-aft and 150° athwartship and the maximum source level is 242 dB re: 1 μPa.

Each ping consists of eight (in water greater than 1,000 m) or four (less than 1,000 m) successive, fan-shaped transmissions, each ensonifying a sector that extends 1° fore-aft. Continuous-wave pulses increase from 2 to 15 milliseconds (ms) long in water depths up to 2,600 m (8,530.2 ft), and FM chirp pulses up to 100 ms long are used in water greater than 2,600 m. The successive transmissions span an overall cross-track angular extent of about 150°, with 2 ms gaps between the pulses for successive sectors.

SBP

The *Langseth* will also operate a Knudsen 320B SBP continuously throughout the cruise simultaneously with the MBES to map and provide information about the sedimentary features and bottom topography. The beam is transmitted as a 27° cone, which is directed downward by a 3.5 kHz transducer in the hull of the *Langseth.* The maximum output is 1,000 watts (204 dB re 1 μPa), but in practice, the output varies with water depth. The pulse interval is one second, but a common mode of operation is to broadcast five pulses at one second intervals followed by a five second pause.

NMFS expects that acoustic stimuli resulting from the proposed operation of the single airgun or the 36 airgun array has the potential to harass marine mammals, incidental to the conduct of the proposed seismic survey. NMFS expects these disturbances to be temporary and result, at worst, in a temporary modification in behavior and/or low-level physiological effects (Level B harassment) of small numbers of certain species of marine mammals. NMFS does not expect that the movement of the *Langseth,* during the conduct of the seismic survey, has the potential to harass marine mammals because of the relatively slow operation speed of the vessel (4.6 knots [kts]; 8.5 km/hr; 5.3 mph) during seismic acquisition.

Description of the Proposed Dates, Duration, and Specified Geographic Region

The survey will occur in the western GOA in the area 52.5° to 59° North, 147.5 to 161° West. The seismic survey will take place in water depths of 25 m to greater than 6,000 m. The Langseth will depart from Kodiak, Alaska on approximately June 28, 2011. The program will start with a refraction survey using OBSs. Approximately 21 OBSs will be deployed along one line; the OBSs will then be retrieved and re-deployed along the next refraction line. OBS deployment will take approximately three days and recovery will take approximately five days; there will be a total of approximately three days of refraction shooting. Following the refraction survey, the MCS survey will take place using the two streamers. MCS and airgun deployment will take approximately three days, and there will be approximately 13 days of MCS operations. Upon completion of seismic operations, all gear will be picked up and the vessel will travel to Dutch Harbor, for arrival on approximately August 4, 2011. Seismic operations in the study area will be carried out for approximately 16 days. Some minor deviation from this schedule is possible, depending on logistics and weather (*i.e.,* the cruise may depart earlier or be extended due to poor weather; there could be an additional three days of seismic operations if collected data are deemed to be of substandard quality).

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

Twenty-five marine mammal species (18 cetacean, 6 pinniped, and the sea otter) are known to or could occur in the GOA study area. Several of these species are listed as endangered under the U.S. Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*), including the North Pacific right (*Eubalaena japonica*), humpback (*Megaptera novaeangliae*), sei (*Balaenoptera borealis*), fin (*Balaenoptera physalus*), blue (*Balaenoptera musculus*), and sperm (*Physeter macrocephalus*) whales, as well as the Cook Inlet distinct population segment (DPS) of beluga whales (*Dephinapterus leucas*) and the western stock of Steller sea lions (*Eumetopias jubatus*). The eastern stock of Steller sea lions is listed as threatened, as is the southwest Alaska DPS of the sea otter (*Enhydra lutris*).

The marine mammals that occur in the proposed survey area belong to four taxonomic groups: odontocetes (toothed cetaceans, such as dolphins), mysticetes (baleen whales), pinnipeds (seals, sea lions, and walrus), and fissipeds (sea otter). Cetaceans and pinnipeds are the subject of the IHA application to NMFS. Walrus sightings are rare in the GOA. Sea otters generally inhabit nearshore areas inside the 40 m (131.2 ft) depth contour (Riedman and Estes, 1990) and could be encountered in coastal waters, but likely would not be encountered in the deep, offshore waters of the study area. The sea otter and Pacific walrus are two marine mammal species mentioned in this document that are managed by the U.S. Fish and Wildlife Service (USFWS) and are not considered further in this analysis; all others are managed by NMFS. The Cook Inlet DPS of beluga whales, California sea lions (*Zalophus c. californianus*), northern fur seals (*Callorhinus ursinus*), and northern elephant seals (*Mirounga angustirostris*) are not likely to be found in the waters of the survey area.

Table 2 (below) presents information on the abundance, distribution, population status, conservation status, and density of the marine mammals that may occur in the proposed survey area during June to August, 2011.

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Table 2. The habitat, regional abundance, and conservation status of marine mammals that may occur in or near the proposed seismic survey area in the western GOA. [See text and Tables 2 to 4 in L-DEO's application and EA for further details.]

Species	Occurrence in/near Survey Area	Habitat	Abundance (Alaska)	Regional Abundance	ESA [1]	MMPA [2]	Density (#/1,000 km^2) Shallow Intermediate Deep Best[3]	Max[4]
Mysticetes								
North Pacific right whale (Eubalaena japonica)	Rare	Coastal, shelf	28-31[5]	Low hundreds[6]	EN	D	0 0 0	0 0 0
Gray whale (Eschrichtius robustus)	Uncommon	Coastal	N.A.	19,126[7]	DL EN (Western pop.)	NC D (Western pop.)	0 0 0	0 0 0
Humpback whale (Megaptera novaeangliae)	Common	Coastal, banks	3,000 to 5,000[8]	20,800[9]	EN	D	40.90 12.69 2.61	66.0 66.0 6.53
Minke whale (Balaenoptera acutorostrata)	Uncommon	Coastal, shelf	1,233[10]	25,000[11]	NL	NC	1.40 0.31 0	6.0 6.0 0
Sei whale (Balaenoptera borealis)	Rare	Pelagic	N.A.	7,260 to 12,620[12]	EN	D	0 0 0	0 0 0
Fin whale (Balaenoptera physalus)	Common	Pelagic	1,652[10]	13,620 to 18,680[13]	EN	D	10.62 12.61 2.90	40.0 40.0 10.38
Blue whale (Balaneoptera musculus)	Rare	Pelagic, shelf, coastal	N.A.	3,500[14]	EN	D	0 0 0	0 0 0
Odontocetes								
Sperm whale (Physeter macrocephalus)	Uncommon	Pelagic	159[15]	24,000[16]	EN	D	0 0.11 0.38	0 0.26 1.69
Cuvier's beaked whale (Ziphius cavirostris)	Common	Pelagic	N.A.	20,000[17]	NL	NC	0 1.12 0	0 1.81 0

Species	Occurrence in/near Survey Area	Habitat	Abundance (Alaska)	Regional Abundance	ESA [1]	MMPA [2]	Density (#/1,000 km^2) Shallow Intermediate Deep Best[3]	Max[4]
Baird's beaked whale (Berardius bairdii)	Rare	Pelagic	N.A.	6,000[18]	NL	NC	0 0.37 0	0 0.60 0
Stejneger's beaked whale (Mesoplodon stejnegeri)	Common	Likely pelagic	N.A.	N.A.	NL	NC	0 0 0	0 0 0
Beluga whale (Delphinapterus leucas)	Extralimital	Coastal and ice edges	340[19]	N.A.	EN[34] NL	D[34] NC	0 0 0	0 0 0
Pacific white-sided dolphin (Lagenorhynchus obliquidens)	Common	Pelagic, shelf, coastal	26,880[20]	988,000[21]	NL	NC	2.08 3.96 0	4.76 14.36 0
Risso's dolphin (Grampus griseus)	Extralimital	Pelagic, shelf, coastal	N.A.	838,000[22]	NL	NC	0 0 0	0 0 0
Killer whale (Orcinus orca)	Common	Pelagic, shelf, coastal	2,636[23]	8,500[24]	NL[35]	NC	7.26 7.34 3.79	41.80 41.80 13.53
Short-finned pilot whale (Globicephala macrorhynchus)	Extralimital	Pelagic, shelf, coastal	N.A.	53,000[22]	NL	NC	0 0 0	0 0 0
Harbor porpoise (Phocoena phocoena)	Uncommon	Coastal	11,146[25] 31,046[26]	168,387[27]	NL	NC	3.67 2.87 0	46.71 14.43 0
Dall's porpoise (Phocoenoides dalli)	Common	Pelagic, shelf	83,400[20]	1,186,000[28]	NL	NC	13.57 31.56 25.69	21.77 37.23 62.50
Pinnipeds								
Northern fur seal (Callorhinus ursinus)	Uncommon	Pelagic, breeds coastally	653,171[7]	1.1 million[29]	NL	D	0 0 0	0 0 0
Steller sea lion (Eumetopias jubatus)	Common	Coastal, offshore	58,334 72,223[30] 42,366[31]	N.A.	T[36] EN[36]	D	3.29 2.91 9.80	3.99 4.20 14.70
California sea lion (Zalophus c. californianus)	Uncommon	Coastal	N.A.	238,000[33]	NL	NC	N.A.	N.A.
Harbor seal (Phoca vitulina richardsi)	Uncommon	Coastal	45,975[26]	180,017[32]	NL	NC	1.65 14.03 0	2.0 20.28 0

Species	Occurrence in/near Survey Area	Habitat	Abundance (Alaska)	Regional Abundance	ESA [1]	MMPA [2]	Density (#/1,000 km^2) Shallow Intermediate Deep Best[3]	Max[4]
Northern elephant seal (Mirounga angustirostris)	Uncommon	Coastal, offshore	N.A.	124,000[33]	NL	NC	0 0 0	0 0 0

N.A. Not available or not assessed.
[1] U.S. Endangered Species Act: EN = Endangered, T = Threatened, NL = Not listed.
[2] U.S. Marine Mammal Protection Act: D = Depleted, NC = Not Classified.
[3] Best density estimate as listed in Table 3 of the application.[4] Maximum density estimate as listed in Table 3 of the application.
[5] Bering Sea and Aleutian Islands (Wade et al., 2010).
[6] Western population (Brownell et al., 2001)
[7] Eastern North Pacific (Allen and Angliss, 2010).
[8] GOA (Calambokidis et al., 2008).
[9] North Pacific Ocean (Barlow et al., 2009).
[10] Western GOA and eastern Aleutians (Zerbini et al., 2006).
[11] Northwest Pacific (Buckland et al., 1992; IWC, 2009).
[12] North Pacific (Tillman, 1977).
[13] North Pacific (Ohsumi and Wada, 1974).
[14] Eastern North Pacific (NMFS, 1998).
[15] Western GOA and eastern Aleutians (Zerbini et al., 2004).
[16] Eastern temperate North Pacific (Whitehead, 2002b).
[17] Eastern Tropical Pacific (Wade and Gerrodette, 1993).
[18] Western North Pacific (Reeves and Leatherwood, 1994; Kasuya, 2002).
[19] Cook Inlet stock (Shelden et al, 2010)
[20] Alaska stock (Allen and Angliss, 2010).
[21] North Pacific Ocean (Miyashita, 1993b).
[22] Western North Pacific Ocean (Miyashita, 1993a).
[23] Minimum abundance in Alaska, includes 2,084 resident and 552 GOA, Bering Sea, Aleutian Islands transients (Allen and Angliss, 2010).
[24] Eastern Tropical Pacific (Ford, 2002).
[25] Southeast Alaska stock (Allen and Angliss, 2010).
[26] GOA stock (Allen and Angliss, 2010).
[27] Eastern North Pacific (totals from Carretta et al., 2009 and Allen and Angliss, 2010).
[28] North Pacific Ocean and Bering Sea (Houck and Jefferson, 1999).
[29] North Pacific (Gelatt and Lowry, 2008).
[30] Eastern U.S. Stock (Allen and Angliss, 2010).
[31] Western U.S. Stock (Allen and Angliss, 2010).
[32] Alaska statewide (Allen and Angliss, 2010).
[33] Caretta et al., 2009.
[34] Cook Inlet DPS is listed as Endangered and Depleted; other stocks are not listed.
[35] Stocks in Alaska are not listed, but the southern resident DPS is listed as endangered. AT1 transient in Alaska is considered depleted and a strategic stock (NOAA, 2004a).
[36] Eastern stock is listed as threatened, and the western stock is listed as endangered.

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Refer to Section III and IV of L–DEO's application for detailed information regarding the abundance and distribution, population status, and life history and behavior of these species and their occurrence in the proposed project area. The application also presents how L–DEO calculated the estimated densities for the marine mammals in the proposed survey area. NMFS has reviewed these data and determined them to be the best available scientific information for the purposes of the proposed IHA.

Potential Effects on Marine Mammals

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

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

Tolerance to Sound

Studies on marine mammals' tolerance to sound in the natural environment are relatively rare. Richardson *et al.* (1995) defines tolerance as the occurrence of marine mammals in areas where they are exposed to human activities or man-made noise. In many cases, tolerance develops by the animal habituating to the stimulus (*i.e.,* the gradual waning of responses to a repeated or ongoing stimulus) (Richardson *et al.,* 1995; Thorpe, 1963), but because of ecological or physiological requirements, many marine animals may need to remain in areas where they are exposed to chronic stimuli (Richardson *et al.,* 1995).

Numerous studies have shown that pulsed sounds from airguns are often readily detectable in the water at distances of many kilometers. Malme *et al.,* (1985) studied the responses of humpback whales on their summer feeding grounds in southeast Alaska to seismic pulses from an airgun with a total volume of 100 in^3. They noted that the whales did not exhibit persistent avoidance when exposed to the airgun and concluded that there was no clear evidence of avoidance, despite the possibility of subtle effects, at received levels up to 172 dB re 1 μPa.

Weir (2008) observed marine mammal responses to seismic pulses from a 24 airgun array firing a total volume of either 5,085 in^3 or 3,147 in^3 in Angolan waters between August 2004 and May 2005. She recorded a total of 207 sightings of humpback whales (n = 66), sperm whales (n = 124), and Atlantic spotted dolphins (n = 17) and reported that there were no significant differences in encounter rates (sightings/hr) for humpback and sperm whales according to the airgun array's operational status (*i.e.,* active versus silent).

Masking of Natural Sounds

The term masking refers to the inability of a subject to recognize the occurrence of an acoustic stimulus as a result of the interference of another acoustic stimulus (Clark *et al.,* 2009). Introduced underwater sound may, through masking, reduce the effective communication distance of a marine mammal species if the frequency of the source is close to that used as a signal by the marine mammal, and if the anthropogenic sound is present for a significant fraction of the time (Richardson *et al.,* 1995).

Masking effects of pulsed sounds (even from large arrays of airguns) on marine mammal calls and other natural sounds are expected to be limited. Because of the intermittent nature and low duty cycle of seismic airgun pulses, animals can emit and receive sounds in the relatively quiet intervals between pulses. However, in some situations, reverberation occurs for much or the entire interval between pulses (*e.g.,* Simard *et al.,* 2005; Clark and Gagnon, 2006) which could mask calls. Some baleen and toothed whales are known to continue calling in the presence of seismic pulses, and their calls can usually be heard between the seismic pulses (*e.g.,* Richardson *et al.,* 1986; McDonald *et al.,* 1995; Greene *et al.,* 1999; Nieukirk *et al.,* 2004; Smultea *et al.,* 2004; Holst *et al.,* 2005a,b, 2006; and Dunn and Hernandez, 2009). 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 they continued calling in the presence of seismic pulses (Madsen *et al.,* 2002; Tyack *et al.,* 2003; Smultea *et al.,* 2004; Holst *et al.,* 2006; and Jochens *et al.,* 2008). Dolphins and porpoises commonly are heard calling while airguns are operating (*e.g.,* Gordon *et al.,* 2004; Smultea *et al.,* 2004; Holst *et al.,* 2005a, b; and 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, NMFS expects the masking effects of seismic pulses to be minor, given the normally intermittent nature of seismic pulses. Refer to Appendix B(4) of L–DEO's EA for a more detailed discussion of masking effects on marine mammals.

Behavioral Disturbance

Disturbance includes a variety of effects, including subtle to conspicuous changes in behavior, movement, 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 does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.,* 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 would be present within a particular distance of industrial activities and/or exposed to a particular level of industrial sound. In most cases, this approach likely overestimates the numbers of marine mammals that would be affected in some biologically-important manner.

The sound criteria used to estimate how many marine mammals might be disturbed to some biologically-important degree by a seismic program are based primarily on behavioral observations of a few species. Scientists have conducted detailed studies on humpback, gray, bowhead (*Balaena mysticetus*), and sperm whales. 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.

Baleen Whales—Baleen whales generally tend to avoid operating airguns, but avoidance radii are quite variable (reviewed in Richardson *et al.,* 1995). Whales are often reported to show no overt reactions to pulses from large arrays of airguns at distances beyond a few kms, even though the airgun pulses remain well above ambient noise levels out to much longer distances. However, as reviewed in Appendix B (5) of L–DEO's EA, baleen whales exposed to strong noise pulses from airguns often react by deviating from their normal migration route and/or interrupting their feeding and moving away. 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 (Richardson, *et al.,* 1995). They simply avoided the sound source by displacing their migration route to varying degrees, but within the natural boundaries of the migration corridors.

Studies of gray, bowhead, and humpback whales have shown that seismic pulses with received levels of 160 to 170 dB re 1 μPa (rms) seem to cause obvious avoidance behavior in a substantial fraction of the animals exposed (Malme *et al.,* 1986, 1988; Richardson *et al.,* 1995). In many areas, seismic pulses from large arrays of airguns diminish to those levels at distances ranging from four to 15 km from the source. A substantial proportion of the baleen whales within those distances may show avoidance or other strong behavioral reactions to the airgun array. Subtle behavioral changes sometimes become evident at somewhat lower received levels, and studies summarized in Appendix B (5) of L–

DEO's 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 to 170 dB re 1 μPa (rms).

McCauley *et al.* (1998, 2000a) studied the responses of humpback whales off western Australia to a full-scale seismic survey with a 16 airgun array (2,678 in^3) and to a single airgun (20 in^3) with source level of 227 dB re 1 μPa (p-p). In the 1998 study, they documented that avoidance reactions began at five to eight km from the array, and that those reactions kept most pods approximately three to four km from the operating seismic boat. In the 2000 study, they noted localized displacement during migration of four to five km by traveling pods and seven to 12 km by more sensitive resting pods of 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 the received sound levels. The mean received level for initial avoidance of an approaching airgun was 140 dB re 1 μPa (rms) for humpback pods containing females, and at the mean closest point of approach distance the received level was 143 dB re 1 μPa (rms). The initial avoidance response generally occurred at distances of five to eight km from the airgun array and two km from the single airgun. However, some individual humpback whales, especially males, approached within distances of 100 to 400 m (328 to 1,312 ft), where the maximum received level was 179 dB re 1 μPa (rms).

Data collected by observers during several seismic surveys in the Northwest Atlantic showed that sighting rates of humpback whales were significantly greater during non-seismic periods compared with periods when a full array was operating (Moulton and Holst, 2010). In addition, humpback whales were more likely to swim away and less likely to swim towards a vessel during seismic vs. non-seismic periods (Moulton and Holst, 2010).

Humpback whales on their summer feeding grounds in southeast Alaska did not exhibit persistent avoidance when exposed to seismic pulses from a 1.64–L (100 in^3) airgun (Malme *et al.,* 1985). Some humpbacks seemed "startled" at received levels of 150 to 169 dB re 1 μPa. 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 dB re 1 μPa (rms). However, Moulton and Holst (2010) reported that humpback whales monitored during seismic surveys in the Northwest Atlantic had lower sighting rates and were most often seen swimming away from the vessel during seismic periods compared with periods when airguns were silent.

Studies have 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 direct studies of humpbacks 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, 2007:236).

There are no data on reactions of right whales to seismic surveys, but results from the closely-related bowhead whale show that their responsiveness can be quite variable depending on their activity (migrating versus 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 to 30 km from a medium-sized airgun source at received sound levels of around 120 to 130 dB re 1 μPa (Miller *et al.,* 1999; Richardson *et al.,* 1999; see Appendix B (5) of L–DEO's 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 the summer, bowheads typically begin to show avoidance reactions at received levels of about 152 to 178 dB re 1 μPa (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 stopped 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 western Pacific gray whales feeding off Sakhalin Island, Russia (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).

Various species of *Balaenoptera* (blue, sei, fin, and minke whales) have occasionally been seen 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 (*e.g.,* McDonald *et al.,* 1995; Dunn and Hernandez, 2009; Castellote *et al.,* 2010). Sightings by observers on seismic vessels off the United Kingdom from 1997 to 2000 suggest that, during times of good sightability, sighting rates for mysticetes (mainly fin and sei whales) were similar when large arrays of airguns were shooting vs. silent (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). Castellote *et al.* (2010) reported that singing fin whales in the Mediterranean moved away from an operating airgun array.

Ship-based monitoring studies of baleen whales (including blue, fin, sei, minke, and humpback whales) in the Northwest Atlantic found that overall, this group had lower sighting rates during seismic vs. non-seismic periods (Moulton and Holst, 2010). Baleen whales as a group were also seen significantly farther from the vessel during seismic compared with non-seismic periods, and they were more often seen to be swimming away from the operating seismic vessel (Moulton and Holst, 2010). Blue and minke whales were initially sighted significantly farther from the vessel during seismic operations compared to non-seismic periods; the same trend was observed for fin whales (Moulton and Holst, 2010). Minke whales were most often observed to be swimming away from the vessel when seismic operations were underway (Moulton and Holst, 2010).

Data on short-term reactions by cetaceans to impulsive noises are not necessarily indicative of long-term or biologically significant effects. It is not known whether impulsive sounds affect reproductive rate or distribution and habitat use in subsequent days or years. However, gray whales have 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 (Appendix A in Malme *et al.,* 1984; Richardson *et al.,* 1995; Allen and Angliss, 2010). The western Pacific gray whale population did not seem affected by a seismic survey in its feeding ground during a previous year (Johnson *et al.,* 2007). Similarly, bowhead whales have continued to travel to the eastern Beaufort Sea each summer, and their numbers have increased notably, despite seismic exploration in their summer and autumn range for many years (Richardson *et al.,* 1987; Allen and Angliss, 2010).

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 and (in more detail) in Appendix B of L–DEO's EA have been reported for toothed whales. However, there are recent systematic studies on sperm whales (*e.g.,* Gordon *et al.,* 2006; Madsen *et al.,* 2006; Winsor and Mate, 2006; Jochens *et al.,* 2008; Miller *et al.,* 2009). There is an increasing amount of information about responses of various odontocetes to seismic surveys based on monitoring studies (*e.g.,* 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; Moulton and Holst, 2010).

Seismic operators and marine mammal observers on seismic vessels regularly see dolphins and other small toothed whales near operating airgun arrays, but in general there is a tendency for most delphinids to show some avoidance of operating seismic vessels (*e.g.,* 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; Barkaszi *et al.,* 2009; Moulton and Holst, 2010). 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 arrays of airguns are firing (*e.g.,* Moulton and Miller, 2005). Nonetheless, small toothed whales more often 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 (*e.g.,* Stone and Tasker, 2006; Weir, 2008; Barry *et al.,* 2010; Moulton and Holst, 2010). In most cases, the avoidance radii for delphinids appear to be small, on the order of one km 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 in the southeastern Beaufort Sea during summer found that sighting rates of beluga whales were significantly lower at distances 10 to 20 km compared with 20 to 30 km from an operating airgun array, and observers on seismic boats in that area rarely see belugas (Miller *et al.,* 2005; Harris *et al.,* 2007).

Captive bottlenose dolphins (*Tursiops truncatus*) 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). However, the animals tolerated high received levels of sound before exhibiting aversive behaviors.

Results for porpoises depend on species. The limited available data suggest that harbor porpoises show stronger avoidance of seismic operations than do Dall's porpoises (Stone, 2003; MacLean and Koski, 2005; Bain and Williams, 2006; Stone and Tasker, 2006). Dall's porpoises seem relatively tolerant of airgun operations (MacLean and Koski, 2005; Bain and Williams, 2006), although they too have been observed to avoid large arrays of operating airguns (Calambokidis and Osmek, 1998; Bain and Williams, 2006). This apparent difference in responsiveness of these two porpoise species is consistent with their relative responsiveness to boat traffic and some other acoustic sources (Richardson *et al.,* 1995; Southall *et al.,* 2007).

Most studies of sperm whales exposed to airgun sounds indicate that the sperm whale shows considerable tolerance of airgun pulses (*e.g.,* Stone, 2003; Moulton *et al.,* 2005, 2006a; Stone and Tasker, 2006; Weir, 2008). In most cases the whales do not show strong avoidance, and they continue to call (see Appendix B of L–DEO's EA for review). However, controlled exposure experiments in the Gulf of Mexico indicate that foraging behavior was 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 to seismic surveys. However, some northern bottlenose whales (*Hyperoodon ampullatus*) remained in the general area and 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 (*e.g.,* Wursig *et al.,* 1998). They may also dive for an extended period when approached by a vessel (*e.g.,* 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). Based on a single observation, Aguilar-Soto *et al.* (2006) suggested that foraging efficiency of Cuvier's beaked whales may be reduced by close approach of vessels. 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. In fact, Moulton and Holst (2010) reported 15 sightings of beaked whales during seismic studies in the Northwest Atlantic; seven of those sightings were made at times when at least one airgun was operating. There was little evidence to indicate that beaked whale behavior was affected by airgun operations; sighting rates and distances were similar during seismic and non-seismic periods (Moulton and Holst, 2010).

There are increasing indications that some beaked whales tend to strand when naval exercises involving mid-frequency sonar operation are ongoing nearby (*e.g.,* Simmonds and Lopez-Jurado, 1991; Frantzis, 1998; NOAA and USN, 2001; Jepson *et al.,* 2003; Hildebrand, 2005; Barlow and Gisiner, 2006; see also the Stranding and Mortality section in this notice). These strandings are apparently a disturbance response, although auditory or other injuries or other physiological effects may also be involved. Whether beaked whales would ever react similarly to seismic surveys is unknown. Seismic survey sounds are quite different from those of the sonar in operation during the above-cited incidents.

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, belugas, and harbor porpoises (Appendix B of L–DEO's EA).

Pinnipeds—Pinnipeds are not likely to show a strong avoidance reaction to the airgun array. Visual monitoring from seismic vessels has shown only slight (if any) avoidance of airguns by pinnipeds, and only slight (if any) changes in behavior, see Appendix B(5) of L–DEO's EA. In the Beaufort Sea, some ringed seals avoided an area of 100 m to (at most) a few hundred meters around seismic vessels, but many seals remained within 100 to 200 m (328 to 656 ft) of the trackline as the operating airgun array passed by (*e.g.,* Harris *et al.,* 2001; Moulton and Lawson, 2002; Miller *et al.,* 2005). Ringed seal sightings averaged somewhat farther away from the seismic vessel when the airguns were operating than when they were not, but the difference was small (Moulton and Lawson, 2002). Similarly, in Puget Sound, sighting distances for harbor seals and California sea lions tended to be larger when airguns were operating (Calambokidis and Osmek, 1998). Previous telemetry work suggests that avoidance and other behavioral reactions may be stronger than evident to date from visual studies (Thompson *et al.,* 1998).

Hearing Impairment and Other Physical Effects

Exposure to high intensity sound for a sufficient duration may result in auditory effects such as a noise-induced threshold shift—an increase in the auditory threshold after exposure to noise (Finneran, Carder, Schlundt, and Ridgway, 2005). Factors that influence the amount of threshold shift include the amplitude, duration, frequency content, temporal pattern, and energy distribution of noise exposure. The magnitude of hearing threshold shift normally decreases over time following cessation of the noise exposure. The amount of threshold shift just after exposure is called the initial threshold shift. If the threshold shift eventually returns to zero (i.e., the threshold returns to the pre-exposure value), it is called temporary threshold shift (TTS) (Southall *et al.,* 2007).

Researchers have studied TTS in certain captive odontocetes and pinnipeds exposed to strong sounds (reviewed in Southall *et al.,* 2007). However, there has been no specific documentation of TTS let alone permanent hearing damage, *i.e.,* permanent threshold shift (PTS), in free-ranging marine mammals exposed to sequences of airgun pulses during realistic field conditions.

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). Table 1 (above) presents the distances from the *Langseth'*s airguns at which the received energy level (per pulse, flat-weighted) would be expected to be greater than or equal to 180 dB re 1 μPa (rms).

To avoid the potential for injury, NMFS (1995, 2000) concluded that cetaceans should not be exposed to pulsed underwater noise at received levels exceeding 180 dB re 1 μPa (rms). NMFS believes that to avoid the potential for permanent physiological damage (Level A harassment), cetaceans should not be exposed to pulsed underwater noise at received levels exceeding 180 dB re 1 μPa (rms). The 180 dB level is a shutdown criterion applicable to cetaceans, as specified by NMFS (2000); these levels were used to establish the EZs. NMFS also assumes that cetaceans exposed to levels exceeding 160 dB re 1 μPa (rms) may experience Level B harassment.

Researchers have derived TTS information for odontocetes from studies on the bottlenose dolphin and beluga. For the one harbor porpoise tested, the received level of airgun sound that elicited onset of TTS was lower (Lucke *et al.,* 2009). If these results from a single animal are representative, it is inappropriate to assume that onset of TTS occurs at similar received levels in all odontocetes (*cf.* Southall *et al.,* 2007). Some cetaceans apparently can incur TTS at considerably lower sound exposures than are necessary to elicit TTS in the beluga or bottlenose dolphin.

For baleen whales, there are no data, direct or indirect, on levels or properties of sound that are required to induce TTS. The frequencies to which baleen whales are most sensitive are assumed to be lower than those to which odontocetes are most sensitive, and natural background noise levels at those low frequencies tend to be higher. 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). From this, it is suspected that received levels causing TTS onset may also be higher in baleen whales (Southall *et al.,* 2007). For this proposed study, L–DEO expects no cases of TTS given the strong likelihood that baleen whales would avoid the approaching airguns (or vessel) before being exposed to levels high enough for TTS to occur.

In pinnipeds, TTS thresholds associated with exposure to brief pulses (single or multiple) of underwater sound have not been measured. Initial evidence from more prolonged (non-pulse) exposures suggested that some pinnipeds (harbor seals in particular) incur TTS at somewhat lower received levels than do small odontocetes exposed for similar durations (Kastak *et al.,* 1999, 2005; Ketten *et al.,* 2001). The TTS threshold for pulsed sounds has been indirectly estimated as being an SEL of approximately 171 dB re 1 $\mu Pa^2 \cdot s$ (Southall *et al.,* 2007) which would be equivalent to a single pulse with a received level of approximately 181 to 186 dB re 1 μPa (rms), or a series of pulses for which the highest rms values are a few dB lower. Corresponding values for California sea lions and northern elephant seals are likely to be higher (Kastak *et al.,* 2005).

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, whereas 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 at least mild TTS, there has been further speculation about the possibility that some individuals occurring very close to airguns might incur PTS (*e.g.,* Richardson *et al.,* 1995, p. 372*ff;* 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 dBs above that inducing mild TTS if the animal were exposed to strong sound pulses with rapid rise time—see Appendix B(6) of L–DEO's 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 greater than six dB (Southall *et al.,* 2007).

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

Stranding and Mortality—Marine mammals close to underwater detonations of high explosives can be killed or severely injured, and the auditory organs are especially susceptible to injury (Ketten *et al.,* 1993; Ketten, 1995). However, explosives are no longer used for marine waters for commercial seismic surveys or (with rare exceptions) for seismic research; they 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 serious injury, death, or stranding even in the case of large airgun arrays. However, the association of strandings of beaked whales with naval exercises involving mid-frequency active sonar 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 (*e.g.,* Hildebrand, 2005; Southall *et al.,* 2007). Appendix B(6) of L–DEO's 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. Some of these mechanisms are unlikely to apply in the case of impulse sounds. However, there are indications that gas-bubble disease (analogous to "the bends"), induced in supersaturated 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. However, 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 signals 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 one kHz. Typical military mid-frequency sonar emits non-impulse sounds at frequencies of two to 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 connection between the effects of military sonar and seismic surveys on marine mammals. However, evidence that sonar signals can, in special circumstances, lead (at least indirectly) to physical damage and mortality (*e.g.,* Balcomb and Claridge, 2001; NOAA and USN, 2001; Jepson *et al.,* 2003; Fernández *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 (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 (8,490 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 in 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 L–DEO and those involved in the naval exercises associated with strandings.

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, and other types of organ or tissue damage (Cox *et al.,* 2006; Southall *et al.,* 2007). Studies examining such effects are limited. However, resonance effects (Gentry, 2002) and direct noise-induced bubble formations (Crum *et al.,* 2005) are implausible in the case of exposure to an impulsive broadband 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, very little is known about the potential for seismic survey sounds (or other types of strong underwater sounds) to cause non-auditory physical effects in marine mammals. Such effects, if they occur at all, would presumably be limited to short distances 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 and some odontocetes, are especially unlikely to incur non-auditory physical effects.

Potential Effects of Other Acoustic Devices

MBES

L–DEO will operate the Kongsberg EM 122 MBES from the source vessel during the planned study. Sounds from the MBES are very short pulses, occurring for two to 15 ms once every five to 20 s, depending on water depth. Most of the energy in the sound pulses emitted by this MBES is at frequencies near 12 kHz, and the maximum source level is 242 dB re 1 μPa (rms). The beam is narrow (1 to 2°) in fore-aft extent and wide (150°) in the cross-track extent. Each ping consists of eight (in water greater than 1,000 m deep) or four (in water less than 1,000 m deep) successive fan-shaped transmissions (segments) at different cross-track angles. Any given mammal at depth near the trackline would be in the main beam for only one or two of the nine 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 to 15 ms pulse (or two pulses 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: (1) Generally have longer pulse duration than the Kongsberg EM 122; and (2) are often directed close to horizontally versus more downward for the MBES. The area of possible influence of the MBES is much smaller—a narrow band below the source vessel. Also, the duration of exposure for a given marine mammal can be much longer for naval sonar. During L–DEO'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.

Masking—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 MBES signals (12 kHz) do not overlap with the predominant frequencies in the calls, which would avoid any significant masking.

Behavioral Responses—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 melas*) (Rendell and Gordon, 1999), and the previously-mentioned beachings by beaked whales. During exposure to a 21 to 25 kHz "whale-finding" sonar with a source level of 215 dB re 1 μPa, gray whales reacted by orienting slightly away from the source and being deflected from their course by approximately 200 m (Frankel, 2005). When a 38 kHz echosounder and a 150 kHz acoustic Doppler current profiler were transmitting during studies in the Eastern Tropical Pacific, baleen whales showed no significant responses, while spotted and spinner 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 L–DEO, 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.

Very few data are available on the reactions of pinnipeds to echosounder sounds at frequencies similar to those used during seismic operations. Hastie and Janik (2007) conducted a series of behavioral response tests on two captive gray seals to determine their reactions to underwater operation of a 375 kHz multibeam imaging echosounder that included significant signal components down to 6 kHz. Results indicated that the two seals reacted to the signal by significantly increasing their dive durations. Because of the likely brevity of exposure to the MBES sounds, pinniped reactions are expected to be limited to startle or otherwise brief responses of no lasting consequences to the animals.

Hearing Impairment and Other Physical Effects—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 L–DEO is quite different than sonar used for Navy operations. Pulse duration of the MBES is very short relative to the 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 uses near-horizontally-directed sound. Those factors would all reduce the sound energy received from the MBES rather drastically relative to that from naval sonar.

NMFS believes that the brief exposure of marine mammals to one pulse, or small numbers of signals, from the MBES is not likely to result in the harassment of marine mammals.

SBP

L–DEO will also operate a SBP from the source vessel during the proposed survey. Sounds from the SBP are very short pulses, occurring for one to four ms once every second. Most of the energy in the sound pulses emitted by the SBP is at 3.5 kHz, and the beam is directed downward. The SBP on the *Langseth* has a maximum source level of 204 dB re 1 μPa.

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—even for an SBP more powerful than that on the *Langseth*—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.

Masking—Marine mammal communications will not be masked appreciably by the SBP signals given the directionality of the signal and the brief period when an individual mammal is likely to be within its beam. 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.

Behavioral Responses—Marine mammal behavioral reactions to other pulsed sound sources are discussed above, 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 SBP are considerably weaker than those from the MBES. Therefore, behavioral responses are not expected unless marine mammals are very close to the source.

Hearing Impairment and Other Physical Effects—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, including airguns. 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.

Acoustic Release Signals

The acoustic release transponder used to communicate with the OBSs uses frequencies 9 to 13 kHz. These signals will be used very intermittently. It is unlikely that the acoustic release signals would have a significant effect on marine mammals through masking, disturbance, or hearing impairment. Any effects likely would be negligible given the brief exposure at presumably low levels.

The potential effects to marine mammals described in this section of the document do not take into consideration the proposed monitoring and mitigation measures described later in this document (see the "Proposed Mitigation" and "Proposed Monitoring and Reporting" sections) which, as noted are designed to effect the least practicable adverse impact on affected marine mammal species and stocks.

Anticipated Effects on Marine Mammal Habitat

The proposed seismic survey will not result in any permanent impact on habitats used by the marine mammals in the proposed survey area, including the food sources they use (*i.e.* fish and invertebrates), and there will be no physical damage to any habitat. While it is anticipated that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification, this impact to habitat is temporary and reversible and was considered in further detail earlier in this document, as behavioral modification. The main impact associated with the proposed activity will be temporarily elevated noise levels and the associated direct effects on marine mammals, previously discussed in this notice.

A total of approximately 21 OBSs will be deployed during the proposed study. Scripps LC4x4 OBSs will be used; this type of OBS has a volume of approximately 1 m^3, with an anchor that consists of a large piece of steel grating (approximately 1 m^2). OBS anchors will be left behind upon equipment recovery. Although OBS placement will disrupt a very small area of seafloor habitat and could disturb benthic invertebrates, the impacts are expected to be localized and transitory.

Anticipated Effects on Fish

One reason for the adoption of airguns as the standard energy source for marine seismic surveys is that, unlike explosives, they have not been associated with large-scale fish kills. However, existing information on the impacts of seismic surveys on marine fish populations is limited (see Appendix D of L–DEO's EA). There are three types of potential effects of exposure to seismic surveys: (1) Pathological, (2) physiological, and (3) behavioral. Pathological effects involve lethal and temporary or permanent sub-lethal 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 could potentially 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. Furthermore, the available information on the impacts of seismic surveys on marine fish is from studies of individuals or portions of a population; there have been no studies at the population scale. The studies of individual fish have often been on caged fish that were exposed to airgun pulses in situations not representative of an actual seismic survey. Thus, available information provides limited insight on possible real-world effects at the ocean or population scale.

Hastings and Popper (2005), Popper (2009), and Popper and Hastings (2009a,b) provided recent critical reviews of the known effects of sound on fish. The following sections provide a general synopsis of the available information on the effects of exposure to seismic and other anthropogenic sound as relevant to fish. The information comprises results from scientific studies of varying degrees of rigor plus some anecdotal information. Some of the data sources may have serious shortcomings in methods, analysis, interpretation, and reproducibility that must be considered when interpreting their results (see Hastings and Popper, 2005). Potential adverse effects of the program's sound sources on marine fish are noted.

Pathological Effects—The potential for pathological damage to hearing structures in fish depends on the energy level of the received sound and the physiology and hearing capability of the species in question (see Appendix D L–DEO's EA). For a given sound to result in hearing loss, the sound must exceed, by some substantial amount, the hearing threshold of the fish for that sound (Popper, 2005). The consequences of temporary or permanent hearing loss in individual fish on a fish population are unknown; however, they likely depend on the number of individuals affected and whether critical behaviors involving sound (*e.g.,* predator avoidance, prey capture, orientation and navigation, reproduction, *etc.*) are adversely affected.

Little is known about the mechanisms and characteristics of damage to fish that may be inflicted by exposure to seismic survey sounds. Few data have been presented in the peer-reviewed scientific literature. As far as L–DEO and NMFS know, there are only two papers with proper experimental methods, controls, and careful pathological investigation implicating sounds produced by actual seismic survey airguns in causing adverse anatomical effects. One such study indicated anatomical damage, and the second indicated TTS in fish hearing. The anatomical case is McCauley *et al.* (2003), who found that exposure to airgun sound caused observable anatomical damage to the auditory maculae of pink snapper (*Pagrus auratus*). This damage in the ears had not been repaired in fish sacrificed and examined almost two months after exposure. On the other hand, Popper *et al.* (2005) documented only TTS (as determined by auditory brainstem response) in two of three fish species from the Mackenzie River Delta. This study found that broad whitefish (*Coregonus nasus*) exposed to five airgun shots were not significantly different from those of controls. During both studies, the repetitive exposure to sound was greater than would have occurred during a typical seismic survey. However, the substantial low-frequency energy produced by the airguns [less than 400 Hz in the study by McCauley *et al.* (2003) and less than approximately 200 Hz in Popper *et al.* (2005)] likely did not propagate to the fish because the water in the study areas was very shallow (approximately nine m in the former case and less than two m in the latter). Water depth sets a lower limit on the lowest sound frequency that will propagate (the "cutoff frequency") at about one-quarter wavelength (Urick, 1983; Rogers and Cox, 1988).

Wardle *et al.* (2001) suggested that in water, acute injury and death of organisms exposed to seismic energy depends primarily on two features of the sound source: (1) The received peak pressure and (2) the time required for the pressure to rise and decay. Generally, as received pressure increases, the period for the pressure to rise and decay decreases, and the chance of acute pathological effects increases. According to Buchanan *et al.* (2004), for the types of seismic airguns and arrays involved with the proposed program, the pathological (mortality) zone for fish would be expected to be within a few meters of the seismic source. Numerous other studies provide examples of no fish mortality upon exposure to seismic sources (Falk and Lawrence, 1973; Holliday *et al.,* 1987; La Bella *et al.,* 1996; Santulli *et al.,* 1999; McCauley *et al.,* 2000a,b, 2003; Bjarti, 2002; Thomsen, 2002; Hassel *et al.,* 2003; Popper *et al.,* 2005; Boeger *et al.,* 2006).

Some studies have reported, some equivocally, that mortality of fish, fish eggs, or larvae can occur close to seismic sources (Kostyuchenko, 1973; Dalen and Knutsen, 1986; Booman *et al.,* 1996; Dalen *et al.,* 1996). Some of the reports claimed seismic effects from treatments quite different from actual seismic survey sounds or even reasonable surrogates. However, Payne *et al.* (2009) reported no statistical differences in mortality/morbidity between control and exposed groups of capelin eggs or monkfish larvae. Saetre and Ona (1996) applied a 'worst-case scenario' mathematical model to investigate the effects of seismic energy on fish eggs and larvae. They concluded that mortality rates caused by exposure to seismic surveys are so low, as compared to natural mortality rates, that the impact of seismic surveying on recruitment to a fish stock must be regarded as insignificant.

Physiological Effects—Physiological effects refer to cellular and/or biochemical responses of fish to acoustic stress. Such stress potentially could affect fish populations by increasing mortality or reducing reproductive success. Primary and secondary stress responses of fish after exposure to seismic survey sound appear to be temporary in all studies done to date (Sverdrup *et al.,* 1994; Santulli *et al.,* 1999; McCauley *et al.,* 2000a,b). The periods necessary for the biochemical changes to return to normal are variable and depend on numerous aspects of the biology of the species and of the sound stimulus (see Appendix D of L–DEO's EA).

Behavioral Effects—Behavioral effects include changes in the distribution, migration, mating, and catchability of fish populations. Studies investigating the possible effects of sound (including seismic survey sound) on fish behavior have been conducted on both uncaged and caged individuals (*e.g.,* Chapman and Hawkins, 1969; Pearson *et al.,* 1992; Santulli *et al.,* 1999; Wardle *et al.,* 2001; Hassel *et al.,* 2003). Typically, in these studies fish exhibited a sharp startle response at the onset of a sound followed by habituation and a return to normal behavior after the sound ceased.

In general, any adverse effects on fish behavior or fisheries attributable to seismic testing may depend on the species in question and the nature of the fishery (season, duration, fishing method). They may also depend on the age of the fish, its motivational state, its size, and numerous other factors that are difficult, if not impossible, to quantify at this point, given such limited data on effects of airguns on fish, particularly under realistic at-sea conditions.

Anticipated Effects on Fisheries

It is possible that the *Langseth'*s streamers may become entangled with various types of fishing gear. Salmon, cod, rockfish, and sablefish fisheries will be operating at the time of the seismic project in the western GOA (ADF&G, 2010). L–DEO will employ avoidance tactics as necessary to prevent conflict. It is not expected that L–DEO's operations will have a significant impact on commercial fisheries in the western GOA. Nonetheless, L–DEO will minimize the potential to have a negative impact on the fisheries by avoiding areas where fishing is actively underway.

There is general concern about potential adverse effects of seismic operations on fisheries, namely a potential reduction in the "catchability" of fish involved in fisheries. Although reduced catch rates have been observed in some marine fisheries during seismic testing, in a number of cases the findings are confounded by other sources of disturbance (Dalen and Raknes, 1985; Dalen and Knutsen, 1986; Lokkeborg, 1991; Skalski *et al.,* 1992; Engas *et al.,* 1996). In other airgun experiments, there was no change in catch per unit effort (CPUE) of fish when airgun pulses were emitted, particularly in the immediate vicinity of the seismic survey (Pickett *et al.,* 1994; La Bella *et al.,* 1996). For some species, reductions in catch may have resulted from a change in behavior of the fish, e.g., a change in vertical or horizontal distribution, as reported in Slotte *et al.* (2004).

Anticipated Effects on Invertebrates

The existing body of information on the impacts of seismic survey sound on marine invertebrates is very limited. However, there is some unpublished and very limited evidence of the potential for adverse effects on invertebrates, thereby justifying further discussion and analysis of this issue. The three types of potential effects of exposure to seismic surveys on marine invertebrates are pathological, physiological, and behavioral. Based on the physical structure of their sensory organs, marine invertebrates appear to be specialized to respond to particle displacement components of an impinging sound field and not to the pressure component (Popper *et al.,* 2001; see also Appendix E of L–DEO's EA).

The only information available on the impacts of seismic surveys on marine invertebrates involves studies of individuals; there have been no studies at the population scale. Thus, available information provides limited insight on possible real-world effects at the regional or ocean scale. The most important aspect of potential impacts concerns how exposure to seismic survey sound ultimately affects invertebrate populations and their viability, including availability to fisheries.

Literature reviews of the effects of seismic and other underwater sound on invertebrates were provided by Moriyasu *et al.* (2004) and Payne *et al.* (2008). The following sections provide a synopsis of available information on the effects of exposure to seismic survey sound on species of decapod crustaceans and cephalopods, the two taxonomic groups of invertebrates on which most such studies have been conducted. The available information is from studies with variable degrees of scientific soundness and from anecdotal information. A more detailed review of the literature on the effects of seismic survey sound on invertebrates is provided in Appendix E of L–DEO's EA.

Pathological Effects—In water, lethal and sub-lethal injury to organisms exposed to seismic survey sound appears to depend on at least two features of the sound source: (1) The received peak pressure; and (2) the time required for the pressure to rise and decay. Generally, as received pressure increases, the period for the pressure to rise and decay decreases, and the chance of acute pathological effects increases. For the type of airgun array planned for the proposed program, the pathological (mortality) zone for crustaceans and cephalopods is expected to be within a few meters of the seismic source, at most; however, very few specific data are available on levels of seismic signals that might damage these animals. This premise is based on the peak pressure and rise/decay time characteristics of seismic airgun arrays currently in use around the world.

Some studies have suggested that seismic survey sound has a limited pathological impact on early developmental stages of crustaceans (Pearson *et al.,* 1994; Christian *et al.,* 2003; DFO, 2004). However, the impacts appear to be either temporary or insignificant compared to what occurs under natural conditions. Controlled field experiments on adult crustaceans (Christian *et al.,* 2003, 2004; DFO, 2004) and adult cephalopods (McCauley *et al.,* 2000a,b) exposed to seismic survey sound have not resulted in any significant pathological impacts on the animals. It has been suggested that exposure to commercial seismic survey activities has injured giant squid (Guerra *et al.,* 2004), but the article provides little evidence to support this claim.

Physiological Effects—Physiological effects refer mainly to biochemical responses by marine invertebrates to acoustic stress. Such stress potentially could affect invertebrate populations by increasing mortality or reducing reproductive success. Primary and secondary stress responses (*i.e.,* changes in haemolymph levels of enzymes, proteins, *etc.*) of crustaceans have been noted several days or months after exposure to seismic survey sounds (Payne *et al.,* 2007). The periods necessary for these biochemical changes to return to normal are variable and depend on numerous aspects of the biology of the species and of the sound stimulus.

Behavioral Effects—There is increasing interest in assessing the possible direct and indirect effects of seismic and other sounds on invertebrate behavior, particularly in relation to the consequences for fisheries. Changes in behavior could potentially affect such aspects as reproductive success, distribution, susceptibility to predation, and catchability by fisheries. Studies investigating the possible behavioral effects of exposure to seismic survey sound on crustaceans and cephalopods have been conducted on both uncaged and caged animals. In some cases, invertebrates exhibited startle responses (*e.g.,* squid in McCauley *et al.,* 2000a,b). In other cases, no behavioral impacts were noted (*e.g.,* crustaceans in Christian *et al.,* 2003, 2004; DFO 2004). There have been anecdotal reports of reduced catch rates of shrimp shortly after exposure to seismic surveys; however, other studies have not observed any significant changes in shrimp catch rate (Andriguetto-Filho *et al.,* 2005). Similarly, Parry and Gason (2006) did not find any evidence that lobster catch rates were affected by seismic surveys. Any adverse effects on crustacean and cephalopod behavior or fisheries attributable to seismic survey sound depend on the species in question and the nature of the fishery (season, duration, fishing method).

Proposed Mitigation

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

L–DEO has based the mitigation measures described herein, to be implemented for the proposed seismic survey, on the following:

(1) Protocols used during previous L–DEO seismic research cruises as approved by NMFS;

(2) Previous IHA applications and IHAs approved and authorized by NMFS; and

(3) Recommended best practices in Richardson *et al.* (1995), Pierson *et al.* (1998), and Weir and Dolman, (2007).

To reduce the potential for disturbance from acoustic stimuli associated with the activities, L–DEO and/or its designees has proposed to implement the following mitigation measures for marine mammals:

(1) Proposed exclusion zones;

(2) Power-down procedures;

(3) Shut-down procedures;

(4) Ramp-up procedures; and

(5) Special procedures for situations and species of concern.

Planning Phase—The PIs worked with L–DEO and NSF to identify potential time periods to carry out the survey taking into consideration key factors such as environmental conditions (i.e., the seasonal presence of marine mammals, sea turtles, and sea birds), weather conditions, and equipment. The survey was previously scheduled for September, 2010; however after further consideration, it was viewed as not a viable operational option because of the strong possibility of not being able to carry out the science mission under potential weather conditions in the region at that time of year. Also, the late June to early August cruise avoids the peak in humpback abundance (late August to early September) and the peak of the marine mammal harvest (generally September to December, with a reduction in hunting effort in summer).

Reducing the size of the energy source was also considered, but it was decided that the 6,600 in^3, 36 airgun array is necessary to penetrate through the seafloor to accurately delineate the geologic features and to achieve the primary scientific objectives of the program. A large source that is rich in relatively low-frequency seismic energy is required to penetrate to depths greater than 20 to 30 km (10.8 to 16.2 nmi) and image the deep fault that causes earthquakes off Alaska. By towing this source configuration at 12 m below the sea surface, the lower frequencies are enhanced. If a smaller source were used, it would inhibit the deep imaging of the fault zone, thus preventing the scientists' ability to carry out their research as proposed and meet their objectives. Similarly, the proposed combination of OBSs and hydrophone streamers are needed to record seismic returns from deep in the earth and determine the depth and geometry of the fault zone, thus meeting the scientific objectives.

Proposed Exclusion Zones—Received sound levels have been determined by empirical corrected measurements for the 36 airgun array, and a L–DEO model was used to predict the EZs for the single 1900LL 40 in^3 airgun, which will be used during power-downs. Results were recently reported for propagation measurements of pulses from the 36 airgun array in two water depths (approximately 1,600 m and 50 m [5,249 to 164 ft]) in the Gulf of Mexico in 2007 to 2008 (Tolstoy *et al.,* 2009). It would be prudent to use the empirical values that resulted to determine EZs for the airgun array. Results of the propagation measurements (Tolstoy *et al.,* 2009) showed that radii around the airguns for various received levels varied with water depth. As no measurements were made in intermediate depth water, values halfway between the deep and shallow-water measurements were used. In addition, propagation varies with array tow depth. The depth of the array was different in the Gulf of Mexico calibration study (6 m [19.7 ft]) than in the proposed survey in the GOA (12 m); thus, correction factors have been applied to the distances reported by Tolstoy *et al.* (2009). The correction factors used were the ratios of the 160, 180, and 190 dB distances from the modeled results for the 6,600 in^3 airgun array towed at 6 m versus 12 m.

Measurements were not reported for a single airgun, so model results will be used. The L–DEO model does not allow for bottom interactions, and thus is most directly applicable to deep water and to relatively short ranges. A detailed description of the modeling effort is predicted in Appendix A of the EA.

Based on the corrected propagation measurements (airgun array) and modeling (single airgun), the distances from the source where sound levels are predicted to be 190, 180, and 160 dB re 1 μPa (rms) were determined (see Table 1 above). The 180 and 190 dB radii are shut-down criteria applicable to cetaceans and pinnipeds, respectively, as specified by NMFS (2000); these levels were used to establish the EZs. If the PSVO detects marine mammal(s) within or about to enter the appropriate EZ, the airguns will be powered-down (or shut-down, if necessary) immediately.

Power-down Procedures—A power-down involves decreasing the number of airguns in use to one airgun, such that the radius of the 180 dB (or 190 dB) zone is decreased to the extent that marine mammals are no longer in or about to enter the EZ. A power-down of the airgun array can also occur when the vessel is moving from one seismic line to another. During a power-down for mitigation, L–DEO will operate one airgun. The continued operation of one airgun is intended to alert marine mammals to the presence of the seismic vessel in the area. In contrast, a shut-down occurs when the *Langseth* suspends all airgun activity.

If the PSVO detects a marine mammal outside the EZ, but it is likely to enter the EZ, L–DEO will power-down the airguns before the animal is within the EZ. Likewise, if a mammal is already within the EZ, when first detected L–DEO will power-down the airguns immediately. During a power-down of the airgun array, L–DEO will also operate the 40 in³ airgun. If a marine mammal is detected within or near the smaller EZ around that single airgun (Table 1), L–DEO will shut-down the airgun (see next section).

Following a power-down, L–DEO will not resume airgun activity until the marine mammal has cleared the EZ. L–DEO will consider the animal to have cleared the EZ if:

- a PSVO has visually observed the animal leave the EZ, or
- a PSVO has not sighted the animal within the EZ for 15 min for species with shorter dive durations (*i.e.,* small odontocetes or pinnipeds), or 30 min for species with longer dive durations (*i.e.,* mysticetes and large odontocetes, including sperm, killer, and beaked whales).

During airgun operations following a power-down (or shut-down) whose duration has exceeded the time limits specified previously, L–DEO will ramp-up the airgun array gradually (see Shut-down and Ramp-up Procedures).

Shut-down Procedures—L–DEO will shut down the operating airgun(s) if a marine mammal is seen within or approaching the EZ for the single airgun. L–DEO will implement a shut-down:

(1) If an animal enters the EZ of the single airgun after L–DEO has initiated a power-down; or

(2) if an animal is initially seen within the EZ of the single airgun when more than one airgun (typically the full airgun array) is operating.

L–DEO will not resume airgun activity until the marine mammal has cleared the EZ, or until the PSVO is confident that the animal has left the vicinity of the vessel. Criteria for judging that the animal has cleared the EZ will be as described in the preceding section.

Ramp-up Procedures—L–DEO will follow a ramp-up procedure when the airgun array begins operating after a specified period without airgun operations or when a power-down has exceeded that period. USGS proposes that, for the present cruise, this period would be approximately nine min. This period is based on the 180 dB radius (1,100 m) for the 36 airgun array towed at a depth of 12 m in relation to the minimum planned speed of the *Langseth* while shooting (7.4 km/hr). L–DEO has used similar periods (approximately 8 to 10 min) during previous L–DEO surveys.

Ramp-up will begin with the smallest airgun in the array (40 in³). Airguns will be added in a sequence such that the source level of the array will increase in steps not exceeding six dB per five min period over a total duration of approximately 35 min. During ramp-up, the Protected Species Observers (PSOs) will monitor the EZ, and if marine mammals are sighted, L–DEO will implement a power-down or shut-down as though the full airgun array 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, L–DEO will not commence the ramp-up unless at least one airgun (40 in³ or similar) has been operating during the interruption of seismic survey operations. Given these provisions, it is likely that the airgun array will not be ramped-up from a complete shut-down at night or in thick fog, because the outer part of the safety zone for that array will not be visible during those conditions. If one airgun has operated during a power-down period, 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 airgun and could move away. L–DEO will not initiate a ramp-up of the airguns if a marine mammal is sighted within or near the applicable EZs during the day or close to the vessel at night.

Special Procedures for Situations and Species of Concern—L–DEO will implement special mitigation procedures as follows:

- The airguns will be shut-down immediately if ESA-listed species for which no takes are being requested (*i.e.,* North Pacific right, sei, blue, and beluga whales) are sighted at any distance from the vessel. Ramp-up will only begin if the whale has not been seen for 30 min.
- Concentrations of humpback, fin, and/or killer whales will be avoided if possible, and the array will be powered-down if necessary. For purposes of this proposed survey, a concentration or group of whales will consist of three or more individuals visually sighted that do not appear to be traveling (*e.g.,* feeding, socializing, *etc.*).
- Seismic operations in Chignik Bay will be conducted from nearshore to offshore waters.
- Avoidance of areas where subsistence fishers are fishing, if requested (or viewed as necessary).

NMFS has carefully evaluated the applicant's proposed mitigation measures and has considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable adverse impact on the affected marine mammal species and stocks and their habitat. NMFS's evaluation of potential measures included consideration of the following factors in relation to one another:

(1) The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;

(2) The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and

(3) The practicability of the measure for applicant implementation.

Based on NMFS's evaluation of the applicant's proposed measures, as well as other measures considered by NMFS or recommended by the public, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable adverse impacts 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 IHAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area.

Monitoring

L–DEO proposes to sponsor marine mammal monitoring during the proposed project, in order to implement the proposed mitigation measures that require real-time monitoring, and to satisfy the anticipated monitoring requirements of the IHA. L–DEO's proposed Monitoring Plan is described below this section. L–DEO understands that this monitoring plan will be subject to review by NMFS, and that refinements may be required. 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. L–DEO 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

PSVOs will be based aboard the seismic source vessel and will watch for marine mammals near the vessel during daytime airgun operations and during any ramp-ups at night. PSVOs will also watch for marine mammals near the seismic vessel for at least 30 min prior to the start of airgun operations after an extended shut-down (*i.e.,* greater than approximately 9 min for this proposed cruise). When feasible, PSVOs will conduct observations during daytime periods when the seismic system is not operating for comparison of sighting rates and behavior with and without airgun operations and between acquisition periods. Based on PSVO observations, the airguns will be powered-down or shut-down when marine mammals are observed within or about to enter a designated EZ. The EZ is a region in which a possibility exists of adverse effects on animal hearing or other physical effects.

During seismic operations in the western GOA, at least four PSOs (PSVO and/or PSAO) will be based aboard the *Langseth.* L–DEO will appoint the PSOs with NMFS's concurrence. Observations will take place during ongoing daytime operations and nighttime ramp-ups of the airguns. During the majority of seismic operations, two PSVOs will be on duty from the observation tower to monitor marine mammals near the seismic vessel. Use of two simultaneous PSVOs will increase the effectiveness of detecting animals near the source vessel. However, during meal times and bathroom breaks, it is sometimes difficult to have two PSVOs on effort, but at least one PSVO will be on duty. PSVO(s) will be on duty in shifts of duration no longer than 4 hrs.

Two PSVOs will also be on visual watch during all nighttime ramp-ups of the seismic airguns. A third PSAO will monitor the PAM equipment 24 hours a day to detect vocalizing marine mammals present in the action area. In summary, a typical daytime cruise would have scheduled two PSVOs on duty from the observation tower, and a third PSAO on PAM. Other crew will also be instructed to assist in detecting marine mammals and implementing mitigation requirements (if practical). Other crew will also be instructed to assist in detecting marine mammals and implementing mitigation requirements. Before the start of the seismic survey, the crew will be given additional instruction on how to do so.

The *Langseth* is a suitable platform for marine mammal observations. When stationed on the observation platform, the eye level will be approximately 21.5 m (70.5 ft) above sea level, and the PSVO will have a good view around the entire vessel. During daytime, the PSVOs will scan the area around the vessel systematically with reticle binoculars (*e.g.,* 7 x 50 Fujinon), Big-eye binoculars (25 x 150), and with the naked eye. During darkness, night vision devices (NVDs) will be available (ITT F500 Series Generation 3 binocular-image intensifier or equivalent), when required. Laser range-finding binoculars (Leica LRF 1200 laser rangefinder or equivalent) will be available to assist with distance estimation. Those are useful in training observers to estimate distances visually, but are generally not useful in measuring distances to animals directly; that is done primarily with the reticles in the binoculars.

When marine mammals are detected within or about to enter the designated EZ, the airguns will immediately be powered-down or shut-down if necessary. The PSVO(s) will continue to maintain watch to determine when the animal(s) are outside the EZ by visual confirmation. Airgun operations will not resume until the animal is confirmed to have left the EZ, or if not observed after 15 min for species with shorter dive durations (small odontocetes and pinnipeds) or 30 min for species with longer dive durations (mysticetes and large odontocetes, including sperm, killer, and beaked whales).

Passive Acoustic Monitoring (PAM)

PAM will complement the visual monitoring program, when practicable. Visual monitoring typically is not effective during periods of poor visibility or at night, and even with good visibility, is unable to detect marine mammals when they are below the surface or beyond visual range. Acoustical monitoring can be used in addition to visual observations to improve detection, identification, and localization of cetaceans. The acoustic monitoring will serve to alert visual observers (if on duty) when vocalizing cetaceans are detected. It is only useful when marine mammals call, but it can be effective either by day or by night, and does not depend on good visibility. It will be monitored in real time so that the PSVOs can be advised when cetaceans are detected.

The PAM system consists of hardware (i.e., hydrophones) and software. The "wet end" of the system consists of a towed hydrophone array that is connected to the vessel by a tow cable. The tow cable is 250 m (820.2 ft) long, and the hydrophones are fitted in the last 10 m (32.8 ft) of cable. A depth gauge is attached to the free end of the cable, and the cable is typically towed at depths less than 20 m (65.6 ft). The array will be deployed from a winch located on the back deck. A deck cable will connect from the winch to the main computer laboratory where the acoustic station, signal conditioning, and processing system will be located. The acoustic signals received by the hydrophones are amplified, digitized, and then processed by the Pamguard software. The system can detect marine mammal vocalizations at frequencies up to 250 kHz.

One Protected Species Acoustic Observer (PSAO, an expert bioacoustician in addition to the four PSVOs), with primary responsibility for PAM, will be onboard the *Langseth.* The towed hydrophones will ideally be monitored by the PSAO 24 hours per day while at the proposed seismic survey area during airgun operations, and during most periods when the *Langseth* is underway while the airguns are not operating. However, PAM may not be possible if damage occurs to the array or back-up systems during operations. The primary PAM streamer on the *Langseth* is a digitial hydrophone streamer. Should the digital streamer fail, back-up systems should include an analog spare streamer and a hull-mounted hydrophone. One PSAO will monitor the acoustic detection system by listening to the signals from two channels via headphones and/or speakers and watching the real-time spectrographic display for frequency ranges produced by cetaceans. The PSAO monitoring the acoustical data will be on shift for one to six hours at a time. All PSOs are expected to rotate through the PAM position, although the expert PSAO will be on PAM duty more frequently.

When a vocalization is detected while visual observations are in progress, the PSAO will contact the PSVO immediately, to alert him/her to the presence of cetaceans (if they have not already been seen), and to allow a power-down or shut-down to be initiated, if required. When bearings (primary and mirror-image) to calling cetacean(s) are determined, the bearings will be related to the PSVO(s) to help him/her sight the calling animal. The information regarding the call will be entered into a database. Data entry will include an acoustic encounter identification number, whether it was linked with a visual sighting, date, time when first and last heard and whenever any additional information was recorded, position and water depth when first detected, bearing if determinable, species or species group (*e.g.,* unidentified dolphin, sperm whale), types and nature of sounds heard (*e.g.,* clicks, continuous, sporadic, whistles, creaks, burst pulses, strength of signal, *etc.*), and any other notable information. The acoustic detection can also be recorded for further analysis.

PSVO Data and Documentation

PSVOs will record data to estimate the numbers of marine mammals exposed to various received sound levels and to document apparent disturbance reactions or lack thereof. Data will be used to estimate numbers of animals potentially 'taken' by harassment (as defined in the MMPA). They will also provide information needed to order a power-down or shut-down of the airguns when a marine mammal is within or near the EZ. Observations will also be made during daytime periods when the *Langseth* is underway without seismic operations. In addition to transits to, from, and through the study area, there will also be opportunities to collect baseline biological data during the deployment and recovery of OBSs.

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

1. Species, group size, 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 airguns or vessel (*e.g.,* none, avoidance, approach, paralleling, *etc.*), and behavioral pace.

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

The data listed under (2) 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 and power-downs or shut-downs will be recorded in a standardized format. Data will be entered into an electronic database. The accuracy of the data entry will be verified by computerized data validity checks as the data are entered and by subsequent manual checking of the database. These procedures will allow initial summaries of data to be prepared during and shortly after the field program, and will facilitate transfer of the data to statistical, graphical, and other programs for further processing and archiving.

Results from the vessel-based observations will provide:

1. The basis for real-time mitigation (airgun power-down or shut-down).

2. Information needed to estimate the number of marine mammals potentially taken by harassment, which must be reported to NMFS.

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

4. Information to compare the distance and distribution of marine mammals relative to the source vessel at times with and without seismic activity.

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

L–DEO will submit a report to NMFS and NSF 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 provide full documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day report will summarize the dates and locations of seismic operations, and all marine mammal sightings (dates, times, locations, activities, associated seismic survey activities). The report will also include estimates of the number and nature of exposures that could result in "takes" of marine mammals by harassment or in other ways.

L–DEO will report all injured or dead marine mammals (regardless of cause) to NMFS as soon as practicable. The report should include the species or description of the animal, the condition of the animal, location, time first found, observed behaviors (if alive) and photo or video, if available. In the unanticipated event that any taking of a marine mammal in a manner prohibited by the proposed IHA occurs, such as an injury, serious injury, or mortality, and is judged to result from the proposed activities, the operator will immediately report the incident to the Chief of the Permits, Conservation, and Education Division, Office of Protected Resources, NMFS. The operator will postpone the proposed activities until NMFS is able to review the circumstances of the take. NMFS will work with the operator to determine whether modifications in the activities are appropriate and necessary, and notify the operator that they may resume sound source operations.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]."

Only take by Level B harassment is anticipated and proposed to be authorized as a result of the proposed marine geophysical survey in the western GOA. Acoustic stimuli (i.e., increased underwater sound) generated during the operation of the seismic airgun array may have the potential to cause marine mammals in the survey area to be exposed to sounds at or greater than 160 dB or cause temporary, short-term changes in behavior. There is no evidence that the planned activities could result in injury, serious injury, or mortality within the specified geographic area for which L–DEO seeks the IHA. The required mitigation and monitoring measures will minimize any potential risk for injury, serious injury, or mortality.

The following sections describe L–DEO's methods to estimate take by incidental harassment and present the applicant's estimates of the numbers of marine mammals that could be affected during the proposed seismic program. The estimates are based on a consideration of the number of marine mammals that could be disturbed appreciably by operations with the 36 airgun array to be used during approximately 2,553 km of survey lines in the western GOA.

L–DEO assumes that, during simultaneous operations of the airgun array and the other sources, any marine mammals close enough to be affected by the MBES and SBP would already be affected by the airguns. However, whether or not the airguns 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 previously. Such reactions are not considered to constitute "taking" (NMFS, 2001). Therefore, L–DEO provides no additional allowance for animals that could be affected by sound sources other than airguns.

There are several sources of systematic data on the numbers and distributions of marine mammals in the coastal and nearshore areas of the GOA, but there are fewer data for offshore areas. Zerbini *et al.* (2003, 2006, 2007) conducted vessel-based surveys in the northern and western GOA from the Kenai Peninsula to the central Aleutian Islands during July to August 2001 to 2003. These surveys included all of the coastal and nearshore areas of the currently proposed study area. Killer whales were the principal target of the surveys, but the abundance and distribution of fin, humpback, and minke whales were also reported. Waite (2003) conducted vessel-based surveys in the northern and western GOA from Prince William Sound to approximately 160° West off the Alaska Peninsula during June 26 to July 15, 2003 (Waite, 2003); cetaceans recorded included small odontocetes, beaked whales, and mysticetes. The eastern part of the surveys by Zerbini *et al.* were confined to waters less than 1,000 m deep with most effort in depths less than 100 m, and all of Waite's survey was confined to waters less than 1,000 m deep with most effort in depths 100 to 1,000 m.

Dahlheim *et al.* (2000) conducted aerial surveys of the nearshore waters from Bristol Bay to Dixon Entrance for harbor porpoises; southeast Alaska was surveyed during June 1 to 26, 1993. Dahlheim and Towell (1994) conducted vessel-based surveys of Pacific white-sided dolphins in the inland waterways of Southeast Alaska during April to May, June or July, and September to early October of 1991 to 1993. In a report on a seismic cruise in southeast Alaska from Dixon Entrance to Kodiak Island during August to September, 2004, MacLean and Koski (2005) included density estimates of cetaceans and pinnipeds for each of three depth ranges (<100 m, 100 to 1,000 m, and >1,000 m) during non-seismic periods. Hauser and Holst (2009) reported density estimates during non-seismic periods for all marine mammals sighted during a September to early October seismic cruise in southeast Alaska for each of the same three depth ranges as MacLean and Koski (2005). Rone *et al.* (2010) conducted surveys of the nearshore and offshore GOA during April, 2009 and provided estimates of densities of humpback and fin whales and provided maps with sightings of other species.

Most surveys for pinnipeds in Alaska waters have estimated the number of animals at haul-out sites, not in the water (*e.g.,* Loughlin, 1994; Sease *et al.,* 2001; Withrow and Cesarone, 2002; Sease and York, 2003). The Department of the Navy (DON) (2009) estimated monthly in-water densities of several species of pinnipeds in the offshore GOA based on shore counts and biological (mostly breeding) information. To our knowledge, the only direct information available on at-sea densities of pinnipeds in and near the proposed survey area was provided by MacLean and Koski (2005) and Hauser and Holst (2009).

Table 2 (Table 5 of the EA) gives the estimated average (best) and maximum densities of marine mammals expected to occur in the waters of the central and western GOA. L–DEO used the densities reported by MacLean and Koski (2005) and Hauser and Holst (2009), and those calculated from effort and sightings in Dahlheim and Towell (1994) and Waite (2003) have been corrected for both detectability and availability bias using correction factors from Dahlheim *et al.* (2000) and Barlow and Forney (2007). 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% probability of sighting an animal that is present along the survey trackline $f(0)$, and it is measured by g(0).

Table 2 (Table 5 of the EA) incorporates the densities from the aforementioned studies plus those from the following surveys. L–DEO included the killer whale and mysticete densities from the easternmost blocks surveyed by Zerbini *et al.* (2006, 2007), and the harbor porpoise densities for the Kodiak and Alaska Peninsula survey areas from Table 3 of Dahlheim and Towell (1994). Maps of effort and sightings in Waite (2003) and Zerbini *et al.* (2006, 2007) were used to roughly allocate effort and sightings between water less than 100 m and 100 to 1,000 m deep. Offshore effort and maps of sightings in the offshore stratum of Rone *et al.* (2010) were used to calculate densities for water depths greater than 1,000 m. Densities of Steller sea lion, northern fur seals, and northern elephant seals in water depths greater than 1,000 m were taken from DON (2009; Appendix E, Table 5) for July, and those in water depths less than 1,000 m are from MacLean and Koski (2005) and Hauser and Holst (2009).

There is some uncertainty about the representativeness of the data and the assumptions used in the calculations below for three main reasons:

(1) The timing of most of the survey effort (17,806 km [9,614.5 nmi]) (i.e., one of the surveys of Dahlheim and Towell [1994] and the surveys of Dahlheim *et al.* (2000), Waite [2003], MacLean and Koski (2005), and Zerbini *et al.* [2006, 2007]) overlaps the timing of the proposed survey, but some survey effort (4,693 km [2,534 nmi])—(i.e., two of the surveys of Dahlheim and Towell [1994] and the surveys of Rone *et al.* [2010] and Hauser and Holst [2009]) was earlier (April or June) or later (September to October) than the proposed July to August survey;

(2) Surveys by MacLean and Koski (2005), Hauser and Holst (2009), and Dahlheim and Towell (1994) were conducted primarily in southeast Alaska (east of the proposed study area); and

(3) Only the McLean and Koski (2005), Hauser and Holst (2009), and Rone *et al.* (2010) surveys included depths greater than 1,000 m, whereas approximately 53% of the proposed line-km are in water depths greater than 1,000 m. However, the densities are based on a considerable survey effort (22,500 km [12,149 nmi], including 17,806 km [9,614.5 nmi] in months that overlap the proposed survey period), and 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 effort-weighted mean densities from all previous surveys, whereas maximum estimates of density come from the individual survey that provided the highest density. For pinnipeds in deep water where only one density was available (DON, 2009), that density was used as the best estimate and the maximum is 1.5x the best estimate.

For one species, the Dall's porpoise, density estimates in the original reports are much higher than densities expected during the proposed survey, because this porpoise is attracted to vessels. L–DEO estimates for Dall's porpoises are from vessel-based surveys without seismic activity; they are overestimates possibly by a factor of 5x, given the tendency of this species to approach vessels (Turnock and Quinn, 1991). Noise from the airgun array during the proposed survey is expected to at least reduce and possibly eliminate the tendency of this porpoise to approach the vessel. Dall's porpoises are tolerant of small airgun sources (MacLean and Koski, 2005) and tolerated higher sound levels than other species during a large-array survey (Bain and Williams, 2006); however, they did respond to that and another large airgun array by moving away (Calambokidis and Osmek, 1998; Bain and Williams, 2006). Because of the probable overestimates, the best and maximum estimates for Dall's porpoises shown in Table 2 (Table 3 of the IHA application) are one-quarter of the reported densities. In fact, actual densities are probably slightly lower than that.

L–DEO's estimates of exposures to various sound levels assume that the proposed surveys will be fully completed including the contingency line; in fact, the ensonified areas calculated using the planned number of line-km have been increased by 25% to accommodate lines that may need to be repeated, equipment testing, etc. As is typical during 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 EZs will result in the power-down or shut-down of seismic operations as a mitigation measure. Thus, the following estimates of the numbers of marine mammals potentially exposed to sound levels of 160 dB re 1 μPa (rms) are precautionary and probably overestimate the actual numbers of marine mammals that might be involved. These estimates also assume that there will be no weather, equipment, or mitigation delays, which is highly unlikely.

L–DEO estimated the number of different individuals that may be exposed to airgun sounds with received levels greater than or equal to 160 dB re 1 μPa (rms) on one or more occasions by considering the total marine area that would be within the 160 dB radius around the operating airgun array on at least one occasion and the expected density of marine mammals. The number of possible exposures (including repeated exposures of the same individuals) can be estimated by considering the total marine area that would be within the 160 dB radius around the operating airguns, including areas of overlap. In the proposed survey, the seismic lines are widely spaced in the survey area, so few individual marine mammals would be exposed more than once during the survey. The area including overlap is only 1.3 times the area excluding overlap. Thus, few individual marine mammals would be exposed more than once during the survey. Moreover, it is unlikely that a particular animal would stay in the area during the entire survey.

For each depth stratum, the number of different individuals potentially exposed to received levels greater than or equal to 160 re 1 μPa (rms) was calculated by multiplying:

(1) The expected species density, either "mean" (*i.e.,* best estimate) or "maximum", times

(2) The anticipated area to be ensonified to that level during airgun operations excluding overlap.

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 of the IHA application) around each seismic line, and then calculating the total area within the buffers. Areas of overlap (because of lines being closer together than the 160 dB radius) were limited and included only once when estimating the number of individuals exposed.

Applying the approach described above, approximately 49,679 km² (14,841.1 nmi²) (approximately 62,098 km² [18,104.9 nmi²] including the 25% contingency) would be within the 160 dB isopleth on one or more occasions during the survey. For less than 100 m, 100 to 1,000 m, and greater than 1,000 m depth ranges, the areas would be 32,451 km² (9,487.4 nmi²) (40,564 km² [11,826.6 nmi²] including the 25% contingency), 8,612 km² (2,510.9 nmi²) (10,765 km² [3,138.6 nmi²]), and 8,616 km² (2,512 nmi²) (10,769 km² [3,139.7 nmi²]), respectively. Because this approach does not allow for turnover in the marine mammal populations in the study area during the course of the survey, the actual number of individuals exposed could be underestimated in some cases. However, the conservative (*i.e.,* probably overestimated) densities used to calculate the numbers exposed may offset this. In addition, the approach assumes that no cetaceans will move away from or toward the trackline as the *Langseth* approaches in response to increasing sound levels prior to the time the levels reach 160 dB, which will result in overestimates for those species known to avoid seismic vessels.

Table 3 (Table 4 of the IHA application) shows the best and maximum estimates of the number of different individual marine mammals that potentially could be exposed to greater than or equal to 160 dB re 1 μPa (rms) during the seismic survey if no animals moved away from the survey vessel. The requested take authorization, given in Table 3 (the far right column of Table 4 of the IHA application), is based on the best estimates rather than the maximum estimates of the numbers exposed, because there was little uncertainty associated with the method of estimating densities. For cetacean species not listed under the ESA that could occur in the study area but were not sighted in the surveys from which density estimates were calculated—gray whale, Risso's dolphin, short-finned pilot whale, and Stejneger's beaked whale—the average group size has been used to request take authorization. For ESA-listed cetacean species unlikely to be encountered during the study (North Pacific right, sei, blue, and beluga whales), the requested takes are zero.

The "best estimate" of the number of individual cetaceans that could be exposed to seismic sounds with received levels greater than or equal to 160 dB re 1 μPa (rms) during the proposed survey is 4,392 (see Table 4 of the IHA application) for all three depth ranges combined. That total includes 1,824 humpback whales, 60 minke whales, 598 fin whales, 5 sperm whales, 12 Cuvier's beaked whales, 4 Baird's beaked whales, 127 Pacific white-sided dolphins, 415 killer whales, and 180 harbor porpoises which would represent 8.7%, 0.2%, 3.7%, 0.1%, 0.1%, 0.1%, 0.1%, 4.9%, and 0.1% of the regional populations, respectively. After humpback whales, Dall's porpoises are expected to be the most common species in the study area; the best estimate of the number of Dall's porpoises that could be exposed is 1,167 or about 0.1% of the regional population. This may be a slight overestimate because the estimated densities are slight overestimates. Estimates for other species are lower. The "maximum estimates" total 12,625 cetaceans for the three depth ranges combined.

"Best estimates" of 270 Steller sea lions and 218 harbor seals could be exposed to airgun sounds with received levels greater than or equal to 160 dB re 1 μPa (rms). These estimates represent 0.3% of the Steller sea lion regional population and less than 0.1% of the harbor seal regional population. The estimated numbers of pinnipeds that could be exposed to received levels greater than or equal to 160 dB re 1 μPa (rms) are probably overestimates of the actual numbers that will be affected. Northern fur seals and northern elephant seals are at their rookeries in August. No take has been requested for North Pacific right, sei, and blue whales, beluga whales, Northern elephant seals, Northern fur seals, or California sea lions because they are unlikely to be encountered in the proposed study area.

TABLE 3—ESTIMATES OF THE POSSIBLE NUMBERS OF MARINE MAMMALS EXPOSED TO DIFFERENT SOUND LEVELS ≥ 160 dB DURING L–DEO'S PROPOSED SEISMIC SURVEY IN THE WESTERN GOA DURING JUNE TO AUGUST, 2011

Species	Estimated number of individuals exposed to sound levels ≥ 160 dB re 1 μPa (Best[1])	Estimated number of individuals exposed to sound levels ≥ 160 dB re 1 μPa (Maximum[1])	Requested take authorization	Approximate percent of regional population[2] (Best)
Mysticetes:				
North Pacific right whale	0	0	0	0
Gray whale	NA	NA	[3] 6	NA
Humpback whale	1,824	3,458	1,824	8.8
Minke whale	60	308	60	0.2
Sei whale	0	0	0	0
Fin whale	598	2,166	598	3.7
Blue whale	0	0	0	0
Odontocetes:				
Sperm whale	5	21	5	< 0.1
Cuvier's beaked whale	12	19	12	0.1
Baird's beaked whale	4	6	4	0.1
Stejneger's beaked whale	0	0	[3] 15	0
Beluga whale	0	0	0	0
Pacific white-sided dolphin	127	348	127	< 0.1
Risso's dolphin	0	0	[3] 33	0
Killer whale	415	2,292	415	4.9
Short-finned pilot whale	0	0	[3] 50	NA
Harbor porpoise	180	2,050	180	0.1
Dall's porpoise	1,167	1,957	1,167	0.1
Pinnipeds				
Northern fur seal	0	0	0	0
Steller sea lion	270	365	270	0.3
California sea lion	NA	NA	NA	NA
Harbor seal	218	299	218	0.1
Northern elephant seal	0	0	0	0

[1] Best and maximum estimates are based on densities from Table 3 (Table 4 of the IHA application) and ensonified areas (including 25% contingency) for 160 dB of 40,564 km², 10,765 km², and 10,770 km² for <100 m, 100 to 1,000 m, and >1,000 m depth ranges, respectively.
[2] Regional population size estimates are from Table 2 (see Table 2 of the IHA application); NA means not available.
[3] Requested takes for species not sighted in surveys from which densities were derived are based on group size.

Encouraging and Coordinating Research

L–DEO and NSF will coordinate the planned marine mammal monitoring program associated with the seismic survey in the western GOA with other parties that may have an interest in the area and/or be conducting marine mammal studies in the same region during the proposed seismic survey. L–DEO and NSF will coordinate with applicable U.S. Federal, State, and Borough agencies, and will comply with their requirements. Actions of this type that are underway include (but are not limited to) the following:

• Coordination with the Alaska Department of Fish and Game concerning fisheries issues in state waters.

• Contact Alaska Native Harbor Seal Commission, the Aleut Marine Mammal Commission, and the Alaska Sea Otter and Steller Sea Lion Commission with regard to potential concerns about interactions with fisheries and subsistence hunting.

• Contact USFWS regarding concerns about possible impacts on sea otters and critical habitat (for ESA).

• Contact USFWS avian biologists (Kathy Kuletz and Tim Bowman) regarding potential interaction with seabirds (for ESA).

• Contact Mike Holley, U.S. Army Corps of Engineers (ACOE), to confirm that no permits will be required by the ACOE for the proposed survey.

• A Coastal Project Questionnaire and Certification statement will be submitted with a copy of the EA to the State of Alaska to confirm that the project is in compliance with state and local Coastal Management Programs.

• Contact the National Weather Service (NWS; Jack Endicott) about the survey with regard to the location of NWS buoys in the survey area and the proposed tracklines.

• Contact the logistics coordinator of the local commercial fish processor, to ensure that there will be minimal interference with the local salmon fishery.

Negligible Impact and Small Numbers Analysis and 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."

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, on behalf of the Secretary, preliminarily finds that L–DEO's activities would result in the incidental take of marine mammals, by Level B harassment only, and that the total taking from the marine seismic survey in the western GOA would have a negligible impact on the affected species or stocks of marine mammals.

For reasons stated previously in this document, the specified activities associated with the marine seismic survey are not likely to cause TTS, PTS, or other non-auditory injury, serious injury, or death, and no such take is anticipated or proposed to be authorized, and the potential for temporary or permanent hearing impairment is very low and will be minimized through the incorporation of the proposed monitoring and mitigation measures.

In making a negligible impact determination, NMFS evaluated factors such as:

(1) The number of anticipated injuries, serious injuries, or mortalities;

(2) The number, nature, and intensity, and duration of Level B harassment (all relatively limited); and

(3) The context in which the takes occur (*i.e.,* impacts to areas of significance, impacts to local populations, and cumulative impacts when taking into account successive/contemporaneous actions when added to baseline data);

(4) The status of stock or species of marine mammals (*i.e.,* depleted, not depleted, decreasing, increasing, stable, impact relative to the size of the population);

(5) Impacts on habitat affecting rates of recruitment/survival; and

(6) The effectiveness of monitoring and mitigation measures.

As mentioned previously, NMFS estimates that 16 species of marine mammals under its jurisdiction could be potentially affected by Level B harassment over the course of the IHA. For each species, these numbers are small (each, one percent or less, except for humpback [8.8%], fin [3.7%], and killer [4.9%] whales) relative to the regional population size.

No injuries, serious injuries, or mortalities are anticipated to occur as a result of the L–DEO's planned marine seismic survey, and none are proposed to be authorized. Only short-term behavioral disturbance is anticipated to occur due to the brief and sporadic duration of the survey activities. No mortality or injury is expected to occur, and due to the nature, degree, and context of behavioral harassment anticipated, the activity is not expected to impact rates of recruitment or survival.

NMFS has preliminarily determined, provided that the aforementioned mitigation and monitoring measures are implemented, that the impact of conducting a marine geophysical survey in the western GOA, June to August, 2011, may result, at worst, in a temporary modification in behavior and/or low-level physiological effects (Level B harassment) of small numbers of certain species of marine mammals.

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

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS preliminarily finds that L–DEO's planned research activities, will result in the incidental take of small numbers of marine mammals, by Level B harassment only, and that the total taking from the marine 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

Section 101(a)(5)(D) also requires NMFS to determine that the authorization will not have an unmitigable adverse effect on the availability of marine mammal species or stocks for subsistence use. There are no relevant subsistence uses of marine mammals in the study area (offshore waters of the western GOA) that implicate MMPA Section 101(a)(5)(D).

Endangered Species Act

Of the species of marine mammals that may occur in the proposed survey area, several are listed as endangered under the ESA, including the North Pacific right, humpback, sei, fin, blue, and sperm whales, as well as the Cook Inlet DPS of beluga whales and the western stock of Steller sea lions. The eastern stock of Steller sea lions is listed as threatened. Critical habitat for the North Pacific right whale and Steller sea lion is also found within the proposed survey area. Under Section 7 of the ESA, NSF has initiated formal consultation with the NMFS, Office of Protected Resources, Endangered Species Division, on this proposed seismic survey. NMFS's Office of Protected Resources, Permits, Conservation and Education Division, has initiated formal consultation under Section 7 of the ESA with NMFS's Office of Protected Resources, Endangered Species Division, to obtain a Biological Opinion evaluating the effects of issuing the IHA on threatened and endangered marine mammals and, if appropriate, authorizing incidental take. NMFS will conclude formal Section 7 consultation prior to making a determination on whether or not to issue the IHA. If the IHA is issued, NSF and L–DEO, in addition to the mitigation and monitoring requirements included in the IHA, will be required to comply with the Terms and Conditions of the Incidental Take Statement corresponding to NMFS's Biological Opinion issued to both NSF and NMFS's Office of Protected Resources.

National Environmental Policy Act (NEPA)

With its complete application, L–DEO provided NMFS a draft EA analyzing the direct, indirect, and cumulative environmental impacts of the proposed specified activities on marine mammals including those listed as threatened or endangered under the ESA. The EA, prepared by LGL on behalf of L–DEO is entitled "Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the western Gulf of Alaska, July-August 2011." Prior to making a final decision on the IHA application, NMFS will either prepare an independent EA, or, after review and evaluation of the L–DEO EA for consistency with the regulations published by the Council of Environmental Quality (CEQ) and NOAA Administrative Order 216–6, Environmental Review Procedures for Implementing the National Environmental Policy Act, adopt the L–DEO EA and make a decision of whether or not to issue a Finding of No Significant Impact (FONSI).

Proposed Authorization

NMFS proposes to issue an IHA to L–DEO for conducting a marine geophysical survey in the western GOA, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. The duration of the IHA would not exceed one year from the date of its issuance.

Information Solicited

NMFS requests interested persons to submit comments and information concerning this proposed project and NMFS' preliminary determination of issuing an IHA (see **ADDRESSES**). Concurrent with the publication of this notice in the **Federal Register**, NMFS is forwarding copies of this application to the Marine Mammal Commission and its Committee of Scientific Advisors.

Dated: May 2, 2011.

James H. Lecky,

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

[FR Doc. 2011–11152 Filed 5–5–11; 8:45 am]

BILLING CODE 3510–22–P

COMMITTEE FOR PURCHASE FROM PEOPLE WHO ARE BLIND OR SEVERELY DISABLED

Procurement List; Proposed Additions

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

ACTION: Proposed additions to the Procurement List.

SUMMARY: The Committee is proposing to add services to the Procurement List that will be provided by nonprofit agencies employing persons who are blind or have other severe disabilities.

Comments Must Be Received on or Before: 6/6/2011.

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 OR TO SUBMIT COMMENTS CONTACT: Barry S. Lineback, *Telephone:* (703) 603–7740, *Fax:* (703) 603–0655, or e-mail *CMTEFedReg@AbilityOne.gov.*

SUPPLEMENTARY INFORMATION: This notice is published pursuant to 41 U.S.C 47(a)(2) and 41 CFR 51–2.3. Its purpose is to provide interested persons an opportunity to submit comments on the proposed actions.

Additions

If the Committee approves the proposed additions, the entities of the Federal Government identified in this notice will be required to procure the services listed below from nonprofit agencies employing persons who are blind or have other severe disabilities.

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. If approved, the action will not result in any additional reporting, recordkeeping or other compliance requirements for small entities other than the small organizations that will provide the services to the Government.
2. If approved, the action will result in authorizing small entities to provide the 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 services proposed for addition to the Procurement List.

Comments on this certification are invited. Commenters should identify the statement(s) underlying the certification on which they are providing additional information.

End of Certification

The following services are proposed for addition to the Procurement List for production by the nonprofit agencies listed:

Services

Service Type/Location: Dining Facility Attendant and Cook Support Service, Army 7th Special Forces Group, Building 4570, Eglin AFB, FL.
NPA: Lakeview Center, Inc., Pensacola, FL.
Contracting Activity: Dept of the Army, W6QM Ft Bragg Contr Ctr, Fort Bragg, NC.

For this project, the DOD contracting activity specifically identified its requirement as Dining Facility Attendant (DFA) and Cook Support Service in its Performance Work Statement (PWS). The dining facility (DFAC) associated with this service requirement is newly constructed and will be under the control and military management of the 7th Special Forces Group. Food service personnel assigned to the Group will operate and manage the DFAC and will be augmented by contractor-provided DFA.

The PWS describes the DFA service tasks as preparation of vegetables, dining room service (prepare, maintain, clean dining areas; clean condiment containers; clean spills and remove soiled dinnerware; clean dining room tables, chairs, booths; clean dining room walls, baseboards, window ledges, doors, doorframes, ceiling fans, pictures, wall art, artificial plants, light fixtures, etc); buss and replace tray carts during meal serving periods; service and maintain patron self-service area; clean and sanitize food service equipment, utensil cleaning, and dishwashing; clean pots, pans, utensils, storage shelves, and racks; facility maintenance and sanitation; and provide trash and garbage service.

Because the 7th Special Forces Group is a deployable, combat unit, it may be absent from Eglin AFB as its mission and training dictates. Cook support will be required when troop strength is under 75% due to training/deployment/re-deployment. At a minimum, cook support will augment 25% of the military manpower at all times, but is not anticipated to exceed 50% of the required military manpower. The military will retain management and operational control during deployments as a Government (civil service) contracting officer's representative will assume those duties. At no time will the AbilityOne nonprofit agency contractor be responsible for the management and operational control of the DFAC.

Service Type/Location: Custodial and Grounds Service, White Sands Missile Range, NM.
NPA: Tresco, Inc., Las Cruces, NM.
Contracting Activity: Dept of the Army, W6QM White Sands Doc, White Sands Missile Range, NM.
Service Type/Location: Janitorial/Custodial Service, San Francisco Maritime National Historical Park, Building E, Lower Fort Mason, San Francisco, CA.
NPA: Toolworks, Inc., San Francisco, CA.
Contracting Activity: Dept of the Interior, National Park Service, Pacific West Region, Oakland, CA.
Service Type/Location: Facilities Maintenance Service, Department of Public Works, Fort Knox, KY.
NPAs: NISH, Vienna, VA (Prime), Lakeview Center, Pensacola, FL (Subcontractor).
Contracting Agency: Mission And Installation Contracting Command Center, Fort Knox, KY.

Barry S. Lineback,

Director, Business Operations.

[FR Doc. 2011–11099 Filed 5–5–11; 8:45 am]

BILLING CODE 6353–01–P

CONSUMER PRODUCT SAFETY COMMISSION

Sunshine Act Meeting Notice

TIME AND DATE: Wednesday, May 11, 2011; 10 a.m.–11 a.m.

PLACE: Hearing Room 420, Bethesda Towers, 4330 East West Highway, Bethesda, Maryland.

STATUS: Closed to the Public.

MATTER TO BE CONSIDERED

Compliance Status Report

The Commission staff will brief the Commission on the status of compliance matters. For a recorded message containing the latest agenda information, call (301) 504–7948.

CONTACT PERSON FOR MORE INFORMATION: Todd A. Stevenson, Office of the