BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XB063

Takes of Marine Mammals Incidental to Specified Activities; Marine Geophysical Survey in the Northwest Pacific Ocean, March through May, 2012

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

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulation, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to Lamont-Doherty Earth Observatory (L-DEO), a part of Columbia University, for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to conducting a marine geophysical (seismic) survey in the northwest Pacific Ocean, March through May, 2012.

DATES: Effective March 24 through May 7, 2012

ADDRESSES: An electronic copy of the IHA and application containing a list of the references used in this document may be obtained by writing to P. Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3225 or by visiting the internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

An electronic 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 by visiting the internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

The following associated documents are also available at the same internet address: the National Science Foundation's (NSF) draft Environmental Analysis (EA) pursuant to Executive Order 12114. The EA incorporates an ''Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Northwest Pacific Ocean, March – April, 2012,'' prepared by LGL Limited, on behalf of NSF; and a finding of no significant impact (FONSI) prepared by the NSF. NMFS prepared its own EA and FONSI, which is available at the same Internet address.. Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

The NMFS Biological Opinion will be available online at: http://www.nmfs.noaa.gov/pr/consultation/opinions.htm.

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

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(D) of the Marine Mammal Protect Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.) directs the Secretary of Commerce to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and, if the taking is limited to harassment, a notice of a proposed

authorization is provided to the public for review.

Authorization for the incidental taking of small numbers of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The authorization must set forth the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the mitigation, monitoring and reporting of such takings. NMFS has defined "negligible impact" 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. NMFS must publish a notice in the Federal Register within 30 days of its determination to 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 October 31, 2011, from L-DEO for the taking by harassment, of marine mammals, incidental to conducting a marine geophysical survey in the northwest Pacific Ocean in international waters. Upon receipt of additional information, NMFS determined the application complete and adequate on December 23, 2011. NMFS made the complete application available for public comment (see ADDRESSES) for this IHA.

L-DEO, with research funding from the U.S. National Science Foundation (NSF), plans to conduct the survey from March 24, 2012, through April 16, 2012. Some minor deviation from these dates is possible, depending on logistics, weather conditions, and the need to repeat some lines if data quality is substandard. Therefore, the authorization is effective from March 24, 2012 to May 7, 2012.

L-DEO received an IHA in 2010 to conduct the same specified activity in the same location. However, due to medical emergencies, L-DEO suspended its operations and was unable to complete the seismic survey. Thus, this 2012 survey will allow L-DEO to acquire data necessary to complete the abbreviated 2010 study.

L-DEO plans to use one source vessel, the R/V Marcus G. Langseth (Langseth), a seismic airgun array, and a single hydrophone streamer to conduct a geophysical survey at the Shatsky Rise, a large igneous plateau in the northwest Pacific Ocean. The survey will provide data necessary to decipher the crustal structure of the Shatsky Rise; may

address major questions of earth history, geodynamics, and tectonics; could impact the understanding of terrestrial magmatism and mantle convection; and may obtain data that could be used to improve estimates of regional earthquake occurrence and distribution. In addition to the operations of the seismic airgun array and hydrophone streamer, L-DEO intends to operate a multibeam echosounder (MBES) and a sub-bottom profiler (SBP) continuously throughout the survey.

L-DEO, the Langseth's operator, will conduct all planned seismic data acquisition activities, with on-board assistance by the scientists who will conduct the study. The scientific team for this survey consists of Drs. Jun Korenaga (Yale University, New Haven, CT) and William Sager (Texas A&M University, College Station, TX).

NMFS expects that acoustic stimuli resulting from the operation of the single airgun or the 36-airgun array has the potential to harass marine mammals, incidental to the conduct of the seismic survey. NMFS expects these disturbances to be temporary and result in a temporary modification in behavior and/or low-level physiological effects (Level B harassment only) 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 kilometers per hour (km/h); 5.3 miles per hour (mph)) during seismic acquisition.

NMFS outlined the purpose of the program in a previous notice for the proposed IHA (77 FR 4765, January 31, 2012). The activities to be conducted have not changed between the proposed IHA notice and this final notice announcing the issuance of the IHA. For a more detailed description of the authorized action, including vessel and

acoustic source specifications, the reader should refer to the notice of the proposed IHA (77 FR 4765, January 31, 2012), the application, and associated documents referenced above this section.

Description of the Specified Geographic Region

L-DEO will conduct the survey in international waters in the northwest Pacific Ocean. The study area will encompass an area on the Shatsky Rise bounded by approximately 33.5 – 36 degrees (°) North by 156 -161° East. Water depths in the survey area range from approximately 3,000 to 5,000 meters (m) (1.9 to 3.1 mi).

Comments and Responses

NMFS published a notice of receipt of the L-DEO application and proposed IHA in the Federal Register on January 31, 2012 (77 FR 4765). During the 30-day public comment period, NMFS received comments from the Marine Mammal Commission (Commission) only. The Commission's comments are online at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm. Following are their comments and NMFS' responses.

Comment 1: The Commission recommends that, before issuing the requested IHA, NMFS require L-DEO to re-estimate the proposed exclusion zones (EZ) and buffer zones and associated takes of marine mammals using site-specific information – if the EZs and buffer zones and numbers of takes are not re-estimated, require L-DEO to provide a detailed justification: (1) for basing the EZs and buffer zones for the proposed survey in the northwest Pacific Ocean on empirical data collected in the Gulf of Mexico (GOM) or on modeling that relies on measurements from the GOM; and (2) that explains why simple ratios were used to adjust for tow depth.

Response: The Langseth will conduct the survey in water depths where site-specific source signature requirements are neither warranted nor practical. Site signature measurements are normally conducted commercially by shooting a test pattern over an ocean bottom instrument in shallow water. This method is neither practical nor valid in water depths as great as 3,000 meters (m) (9,842.5 feet (ft)). The alternative method of conducting site-specific attenuation measurements would require a second vessel, which is impractical both logistically and financially. Sound propagation varies noticeably less between deep water sites than between shallow water sites (because of the reduced signature of bottom interaction), thus decreasing the importance of site-specific estimates.

Based on these reasons, and the information provided by L-DEO in their application and environmental analysis, NMFS is satisfied that the data supplied are sufficient for NMFS to conduct its analysis and support its determinations and therefore no further effort is needed by the applicant. While exposures of marine mammals to acoustic stimuli are difficult to estimate, NMFS is confident that the levels of take provided by L-DEO in their IHA application and EA, and authorized herein are estimated based upon the best available scientific information and estimation methodology. The 160-decibel (dB) zone used to estimate exposure is appropriate and sufficient for purposes of supporting NMFS' analysis and determinations required under section 101(a)(5)(D) of the MMPA and its implementing regulations.

Appendix A in the environmental analysis includes information from the calibration study conducted on the Langseth in 2007 and 2008. This information is available in the EA on NSF's website at http://www.nsf.gov/geo/oce/envcomp/index.jsp. Appendix A describes the modeling process and compares the model results with results of the 2007

to 2008 Langseth calibration experiment in shallow, intermediate, and deep water. The conclusions identified in Appendix A show that the model represents the actual produced levels, particularly within the first few kilometers, where the predicted EZs (i.e., safety radii) lie. At greater distances, local oceanographic variations begin to take effect, and the model tends to over predict. Further, since the modeling matches the observed measurement data, the authors have concluded that the models can continue to be used for defining EZs, including for predicting mitigation radii for various tow depths. The data results from the studies were peer reviewed, and calibration results, although viewed as conservative, were used to determine the cruise-specific EZs.

At present, the L-DEO model does not account for site-specific environmental conditions. The calibration study of the L-DEO model predicted that using site-specific information may actually provide less conservative EZ radii at greater distances. The Final Programmatic Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey prepared pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) did incorporate various site-specific environmental conditions in the modeling of the Detailed Analysis Areas.

The IHA issued to L-DEO, under section 101(a)(5)(D) of the MMPA provides monitoring and mitigation requirements that will protect marine mammals from injury, serious injury, or mortality. L-DEO is required to comply with the IHA's requirements. These analyses are supported by extensive scientific research and data. NMFS is confident in the peer-reviewed results of the L-DEO scientific calibration studies which, although viewed as conservative, are used to determine cruise-specific EZs and which

factor into exposure estimates. NMFS determined that these reviews are the best scientific data available for review of the IHA application and to support the necessary analyses and determinations under the MMPA, Endangered Species Act (ESA; 16 U.S.C. 1531 et seq.) and NEPA.

Based on NMFS' analysis of the likely effects of the specified activity on marine mammals and their habitat, NMFS has determined that the EZs identified in the IHA are appropriate for the survey and that additional field measurement is not necessary at this time. While exposures of marine mammals to acoustic stimuli are difficult to estimate, NMFS is confident that the levels of take authorized have been estimated based upon the best scientific information and estimation methodology. The 160-dB zone used to estimate exposure is appropriate and sufficient for purposes of supporting NMFS' analysis and determinations required under section 101(a)(5)(D) of the MMPA and its implementing regulations.

Comment 2: The Commission recommends that, before issuing the requested IHA, NMFS use species-specific maximum densities (i.e., estimated by multiplying the existing density estimates by a precautionary correction factor) and then re-estimate the anticipated number of takes.

Response: For purposes of this IHA, NMFS is using the best (i.e., average or mean) densities to estimate the number of authorized takes for L-DEO's seismic survey in the northwestern Pacific Ocean as NMFS is confident in the assumptions and calculations used to estimate density for this survey area. NMFS makes a decision on whether to use maximum or best densities on a case-by-case basis, depending on the nature and robustness of existing data. NMFS has used best densities to estimate the number of

incidental takes in IHAs for several seismic surveys in the past. The results of the associated monitoring reports show that the use of the best estimates is appropriate for and does not refute NMFS' determinations.

Comment 3: The Commission recommends that, before issuing the requested IHA, NMFS condition the authorization to prohibit the use of a shortened pause before ramping-up after a power-down or shut-down of the airguns based on the presence of a marine mammal in the EZ and the Langseth's movement (speed and direction).

Response: The IHA specifies the conditions under which the Langseth will resume full-power operations of the airguns. During periods of active seismic operations, there are occasions when the airguns need to be temporarily shut-down (e.g., due to equipment failure, maintenance, or shut-down) or when a power-down is necessary (e.g., when a marine mammal is seen to either enter or about to enter the EZ). In these instances, should the airguns be inactive or powered-down for more than eight minutes, then L-DEO would follow the ramp-up procedures identified in the "Mitigation" section (discussed later in this document) where airguns will be re-started beginning with the smallest airgun in the array and increase in steps not to exceed 6 dB per 5 minutes over a total duration of approximately 30 minutes. NMFS and NSF believe that the 8-minute period in question is an appropriate minimum amount of time to pass after which a ramp-up process should be followed. In these instances, should it be possible for L-DEO to reactivate the airguns without exceeding the 8-minute period (e.g., equipment is fixed or a marine mammal is visually observed to have left the EZ for the full source level), then L-DEO would reactivate the airguns to the full operating source level identified for the survey (in this case, 6,600 in^3) without need for initiating ramp-up procedures. In the

event a marine mammal enters the EZ and L-DEO initiates a power-down, and the protected species observers do not visually observe the marine mammal leaving the EZ, then L-DEO must wait 15 minutes (for species with shorter dive durations – small odontocetes and pinnipeds) or 30 minutes (for species with longer dive durations – mysticetes and large odontocetes) after the last sighting before initiating a 30-minute ramp-up. However, ramp-up will not occur as long as a marine mammal is detected within the EZ, which provides more time for animals to leave the EZ, and accounts for the position, swim speed, and heading of marine mammals within the EZ.

Comment 4: The Commission recommends that, before issuing the requested IHA, NMFS extend the 30-minute period following a marine mammal sighting in the EZ to cover the maximum dive times of all species likely to be encountered.

Response: NMFS recognizes that several species of deep-diving cetaceans are capable of remaining underwater for more than 30 minutes (e.g., sperm whales and several species of beaked whales); however, for the following reasons NMFS believes that 30 minutes is an adequate length for the monitoring period prior to the ramp-up of airguns:

(1) Because the Langseth is required to monitor before ramp-up of the airgun array, the time of monitoring prior to the start-up of any but the smallest array is effectively longer than 30 minutes (ramp-up will begin with the smallest airgun in the array and airguns will be added in sequence such that the source level of the array will increase in steps not exceeding approximately 6 dB per 5-minute period over a total duration of about 30 minutes;

(2) In many cases PSVOs are observing during times when L-DEO is not operating

the seismic airguns and would observe the area prior to the 30-minute observation period;

(3) The majority of the species that may be exposed do not stay underwater more than 30 minutes; and

(4) All else being equal and if deep-diving individuals happened to be in the area in the short time immediately prior to the pre-ramp-up monitoring, if an animal's maximum underwater dive time is 45 minutes, then there is only a one in three chance that the last random surfacing would occur prior to the beginning of the required 30-minute monitoring period and that the animal would not be seen during that 30-minute period.

Finally, seismic vessels are moving continuously (because of the long, towed array and streamer) and NMFS believes that unless the animal submerges and follows at the speed of the vessel (highly unlikely, especially when considering that a significant part of their movement is vertical [deep-diving]), the vessel will be far beyond the length of the EZ within 30 minutes, and therefore it will be safe to start the airguns again.

Under the MMPA, incidental take authorizations must include means of effecting the least practicable impact on marine mammal species and their habitat. Monitoring and mitigation measures are designed to comply with this requirement. The effectiveness of monitoring is science-based, and monitoring and mitigation measures must be "practicable." NMFS believes that the framework for visual monitoring will: (1) be effective at spotting almost all species for which take is requested; and (2) that imposing additional requirements, such as those suggested by the Commission, would not meaningfully increase the effectiveness of observing marine mammals approaching or entering the EZs and thus further minimize the potential for take.

Comment 5: The Commission recommends that, before issuing the requested IHA,

NMFS provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified EZs and buffer zones, including:

(1) Identifying those species that it believes can be detected with a high degree of confidence using visual monitoring only;

(2) Describing detection probability as a function of distance from the vessel;

(3) Describing changes in detection probability under various sea state and weather conditions and light levels; and

(4) Explaining how close to the vessel marine mammals must be for Protected Species Visual Observers (PSVOs) to achieve high nighttime detection rates.

Response: NMFS believes that the planned monitoring program will be sufficient to detect (using visual monitoring and passive acoustic monitoring (PAM)), with reasonable certainty, marine mammals within or entering identified EZs. This monitoring, along with the required mitigation measures, will result in the least practicable adverse impact on the affected species or stocks and will result in a negligible impact on the affected species or stocks of marine mammals. Also, NMFS expects some animals to avoid areas around the airgun array ensonified at the level of the EZ.

NMFS acknowledges that the detection probability for certain species of marine mammal varies depending on the animal's size and behavior as well as sea state and weather conditions and light levels. The detectability of marine mammals likely decreases in low light (i.e., darkness), higher Beaufort sea states and wind conditions, and poor weather (e.g., fog and/or rain). However, at present, NMFS views the combination of visual monitoring and PAM as the most effective monitoring and mitigation

techniques available for detecting marine mammals within or entering the EZ. The final monitoring and mitigation measures are the most effective feasible measures and NMFS is not aware of any additional measures which could meaningfully increase the likelihood of detecting marine mammals in and around the EZ. Further, public comment has not revealed any additional monitoring and mitigation measures that could be feasibly implemented to increase the effectiveness of detection.

NSF and L-DEO are receptive to incorporating proven technologies and techniques to enhance the current monitoring and mitigation program. Until proven technological advances are made nighttime mitigation measures during operations include combinations of the use of PSVOs for ramp-ups, PAM, night vision devices, and continuous shooting of a mitigation airgun. Should the airgun array be powered-down, the operation of a single airgun would continue to serve as a sound deterrent to marine mammals. In the event of a complete shut-down of the airgun array at night for mitigation or repairs, L-DEO suspends the data collection until 30 minutes after nautical twilight-dawn (when PSVOs are able to clear the EZ). L-DEO will not activate the airguns until the entire EZ is visible for at least 30 minutes.

In cooperation with NMFS, L-DEO will be conducting efficacy experiments of NVDs during a future Langseth cruise. In addition, in response to a recommendation from NMFS, L-DEO is evaluating the use of forward-looking thermal imaging cameras to supplement nighttime monitoring and mitigation practices. During other low-power seismic and seafloor mapping surveys, L-DEO successfully used these devices while conducting nighttime seismic operations.

Comment 6: The Commission recommends that, before issuing the requested IHA,

NMFS consult with the funding agency (i.e., NSF) and individual applicants (e.g., L-DEO) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken.

Response: Several studies have reported on the abundance and distribution of marine mammals inhabiting the Pacific Ocean, and L-DEO has incorporated this data into their analyses used to predict marine mammal take in their application. NMFS believes that L-DEO's current approach for estimating abundance in the survey area (prior to the survey) is the best available approach.

There will be significant amounts of transit time during the cruise, and PSVOs will be on watch prior to and after the seismic portions of the survey, in addition to during the survey. The collection of this visual observational data by PSVOs may contribute to baseline data on marine mammals (presence/absence) and provide some generalized support for estimated take numbers, but it is unlikely that the information gathered from this single cruise alone would result in any statistically robust conclusions for any particular species because of the small number of animals typically observed.

NMFS acknowledges the Commission's recommendations and is open to further coordination with the Commission, NSF (the vessel owner), and L-DEO (the ship operator on behalf of NSF), to develop, validate, and implement a monitoring program that will provide or contribute towards a more scientifically sound and reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken. However, the cruise's primary focus is marine geophysical research and the survey may be operationally limited due to considerations such as location, time, fuel,

services, and other resources.

Comment 7: The Commission recommends that, before issuing the requested IHA, NMFS require the applicant to:

(1) Report the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated;

(2) Specify if such animals also were detected visually;

(3) Compare the results from the two monitoring methods (visual versus acoustic) to help identify their respective strengths and weaknesses; and

(4) Use that information to improve mitigation and monitoring methods.

Response: The IHA requires that PSAOs on the Langseth do and record the following when a marine mammal is detected by PAM:

(i) Notify the on-duty PSVO(s) immediately of a vocalizing marine mammal so a power-down or shut-down can be initiated, if required;

(ii) Enter the information regarding the vocalization into a database. The data to be entered 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.

NMFS acknowledges the Commission's request for a comparison between L-DEO's visual and acoustic monitoring programs and we will work with the NSF (the vessel owner) and L-DEO (the ship operator on behalf of NSF) to analyze the results of the two

monitoring methods to help identify their respective strengths and weaknesses. The results of our analyses may provide information to improve mitigation and monitoring for future seismic surveys.

L-DEO reports on the number of acoustic detections made by the PAM system within the post-cruise monitoring reports as required by the IHA. The report also includes a description of any acoustic detections that were concurrent with visual sightings, which allows for a comparison of acoustic and visual detection methods for each cruise. The post-cruise monitoring reports also include the following information: The total operation effort in daylight (hours), the total operation effort at night (hours), the total number of hours of visual observations conducted, the total number of sightings, and the total number of hours of acoustic detections conducted.

LGL Ltd., Environmental Research Associates (LGL), a contractor for L-DEO, has processed sighting and density data, and their publications can be viewed online at: http://www.lgl.com/index.php?option=com_content&view=article&id=69&Itemid=162&lang=en. Post-cruise monitoring reports are currently available on NMFS' MMPA Incidental Take Program website and on the NSF website (http://www.nsf.gov/geo/oce/envcomp/index.jsp) should there be interest in further analysis of this data by the public.

Comment 8: The Commission recommends that, before issuing the requested IHA, NMFS work with NSF to analyze those data to help determine the effectiveness of ramp-up procedures as a mitigation measure for seismic surveys after the data are compiled and quality control measures have been completed.

Response: The IHA requires that PSVOs on the Langseth make observations for 30

minutes prior to ramp-up, during all ramp-ups, and during all daytime seismic operations and record the following information when a marine mammal is sighted:

(i) 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 of the airguns or vessel (e.g., none, avoidance, approach, paralleling, etc., and including responses to ramp-up), and behavioral pace; and

(ii) Time, location, heading, speed, activity of the vessel (including number of airguns operating and whether in state of ramp-up or power-down), Beaufort sea state and wind force, visibility, and sun glare.

One of the primary purposes of monitoring is to result in "increased knowledge of the species" and the effectiveness of monitoring and mitigation measures; the effectiveness of ramp-up as a mitigation measure and marine mammal reaction to ramp-up would be useful information in this regard. NMFS has asked NSF and L-DEO to gather all data that could potentially provide information regarding the effectiveness of ramp-ups as a mitigation measure. However, considering the low numbers of marine mammal sightings and low numbers of ramp-ups, it is unlikely that the information will result in any statistically robust conclusions for this particular seismic survey. Over the long term, these requirements may provide information regarding the effectiveness of ramp-up as a mitigation measure, provided animals are detected during ramp-up.

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

Thirty-four marine mammal species may occur in the Shatsky Rise survey area, including 26 odontocetes (toothed cetaceans), seven mysticetes (baleen whales) and one

species of pinniped during March through May. Six of these species are listed as endangered under the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.), including the blue (Balaenoptera musculus), fin (Balaenoptera physalus), humpback (Megaptera novaeangliae), north Pacific right (Eubalaena japonica), sei (Balaenoptera borealis),and sperm (Physeter macrocephalus) whales.

Based on available data, it is unlikely that the western north Pacific gray whale (Eschrichtius robustus), the pygmy killer (Feresa attenuata), the ginkgo-toothed (Mesoplodon ginkgodens), the Stejneger's (M. stejnegeri), or the Hubb's (M. carlhubbsi) beaked whale would occur in the survey area. Based on available data, L-NMFS does not expect to L-DEO to encounter the western north Pacific gray whale within the study area as gray whales are known to prefer nearshore coastal waters. However, NMFS has authorized take for the species to account for an estimated mean group size that may potentially be exposed to sounds from the seismic survey. L-DEO did not request and NMFS did not authorize take of four species: pygmy killer whale or ginkgo-toothed, Stejneger's, or Hubb's beaked whales; because of the low likelihood of encountering these species during the cruise. Thus, the issued IHA only addresses requested take authorizations for 30 species: seven mysticetes, 22 odontocetes, and one species of pinniped. The species of marine mammals expected to be most common in the survey area (all delphinids) include the short-beaked common (Delphinus delphis), striped (Stenella coeruleoalba), and Fraser's (Lagenodelphis hosei) dolphins, and Dall's porpoise (Phocoenoides dalli).

NMFS has presented a more detailed discussion of the status of these stocks and their occurrence in the northwestern Pacific Ocean in the notice of the proposed IHA (77 FR

4765, January 31, 2012).

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 survey area. The effects of sounds from airgun operations might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent impairment, or non-auditory physical or physiological effects (Richardson et al., 1995; Gordon et al., 2004; Nowacek et al., 2007; Southall et al., 2007).

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

The notice of the proposed IHA (77 FR 4765, January 31, 2012) included a discussion of the effects of sounds from airguns on mysticetes and odontocetes including tolerance, masking, behavioral disturbance, hearing impairment, and other non-auditory physical effects. NMFS refers the reader to L-DEO's application and environmental analysis and NMFS' EA for additional information on the behavioral reactions (or lack thereof) by all types of marine mammals to seismic vessels.

Anticipated Effects on Marine Mammal Habitat

NMFS included a detailed discussion of the potential effects of this action on marine mammal habitat, including physiological and behavioral effects on marine fish and invertebrates in the notice of the proposed IHA (77 FR 4765, January 31, 2012). While NMFS anticipates that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification, this impact to habitat is temporary and reversible which NMFS considered in further detail in the notice of the proposed IHA (77 FR 4765, January 31, 2012) as behavioral modification. The main impact associated with the activity would be temporarily elevated noise levels and the associated direct effects on marine mammals.

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 would implement the following mitigation measures for marine mammals:

(1) Proposed exclusion zones (EZ);

(2) Power-down procedures;

(3) Shutdown procedures; and

(4) Ramp-up procedures.

Exclusion Zones - L-DEO uses safety radii to designate EZs and to estimate take for marine mammals. The 180-dB and 190-dB level shut-down criteria are applicable to cetaceans and pinnipeds, respectively, as specified by NMFS (2000); and L-DEO used these levels to establish the EZs. If the PSVO detects marine mammal(s) within or about to enter the appropriate EZ, the Langseth crew will immediately power-down the airgun array, or perform a shut down if necessary (see Shut-down Procedures). Table 1 shows the distances at which three sound levels (160-, 180-, and 190-dB) are expected to be received from the 36-airgun array and a single airgun in deep water.

Table 1. Measured (array) or predicted (single airgun) distances to which sound levels greater than or equal to 160 and 180 dB re: 1 μPa_{rms} that could be received in deep water using a 36-airgun array, as well as a single airgun towed at a depth of 9 m (29.5 ft) during the proposed survey in the northwest Pacific Ocean, during March - May, 2012. [Distances are based on model results provided by L–DEO.]

Source and Volume	Water Depth	Predicted RMS Distances (m)		
		160 dB	180 dB	190 dB
Single Bolt airgun	Deep (> 1,000 m)	385	40	12
36-Airgun Array		3,850	940	400

Power-down Procedures - A power-down involves decreasing the number of airguns in use 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 (40 cubic inches (in^3)). 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 shutdown occurs when the Langseth suspends all airgun activity.

If the PSVO detects a marine mammal outside the EZ, which is likely to enter the EZ, L-DEO will power-down the airguns before the animal enters the EZ. Likewise, if a mammal is already within the EZ, when first detected L-DEO will power-down the airguns immediately. During a powerdown of the airgun array, L-DEO will operate the 40-in^3 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 safety zone. 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 minutes for species with shorter dive durations (i.e., small odontocetes or pinnipeds), or 30 minutes for species with longer dive durations (i.e., mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, and beaked whales); or
- The vessel has moved outside the EZ (e.g., if a marine mammal is sighted close to the vessel and the ship speed is 8.5 km/h (5.3 mph), it would take the vessel approximately eight minutes to leave the vicinity of the marine mammal).

During airgun operations following a power-down or shutdown whose duration has exceeded the time limits specified previously, L–DEO will ramp up the airgun array gradually (see Shutdown 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.

Considering the conservation status for north Pacific right whales, L-DEO will shut down the airgun(s) immediately in the unlikely event that this species is observed, regardless of the distance from the Langseth. L-DEO will only begin a ramp-up if the right whale has not been seen for 30 minutes.

Ramp-up Procedures - L-DEO will follow a ramp-up procedure when the airgun subarrays begin operating after a specified period without airgun operations or when a power-down has exceeded that period. L-DEO estimates that, for the present cruise, this period will be approximately 8 minutes. This period is based on the 180-dB radius (940 m; 3,083 ft) for the 36-airgun array towed at a depth of 9 m (29.5 ft) in relation to the

minimum planned speed of the Langseth while shooting (8.5 km/h; 5.3 mph; 4.6 kts). L-DEO has used similar periods (8-10 min) during previous L-DEO surveys. L-DEO will not resume operations if a marine mammal has not cleared the EZ as described earlier.

Ramp-up will begin with the smallest airgun in the array (40-in^3). Airguns will be added in a sequence such that the source level of the array will increase in steps not exceeding six dB per 5-minute period over a total duration of approximately 30 minutes. During ramp-up, the PSVOs will monitor the EZ, and if he/she sights a marine mammal, L-DEO will implement a power-down or shut down as though the full airgun array were operational.

If the complete EZ is not visible to the PSVO for at least 30 minutes 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-in^3 or similar) has been operating during the interruption of seismic survey operations. Given these provisions, it is likely that L-DEO will not ramp up the airgun array from a complete shut-down at night or in thick fog, because the outer part of the EZ 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.

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 prescribed the means of effecting the least practicable adverse impact on the affected marine mammal

species and stocks and their habitat. NMFS' 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' evaluation of the applicant's proposed measures, as well as other measures considered by NMFS or recommended by the public, NMFS has determined that the 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.

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 will conduct marine mammal monitoring during the present project, in order to implement the mitigation measures that require real-time monitoring, and to satisfy the

monitoring requirements of the IHA. L-DEO's 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. L-DEO has planned the monitoring work 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

L-DEO will position PSVOs aboard the seismic source vessel to watch for marine mammals near the vessel during daytime airgun operations and during any start-ups at night. PSVOs will also watch for marine mammals near the seismic vessel for at least 30 minutes prior to the start of airgun operations after an extended shut down (i.e., greater than approximately eight minutes for this proposed cruise). When feasible, the 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 Langseth will power-down or shut down the airguns 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 on the Shatsky Rise, at least four protected species observers (PSO) (i.e., either a PSVO and/or a protected species acoustic observer (PSAO)) will be based aboard the Langseth. L-DEO will appoint the PSOs with NMFS' concurrence. The PSOs will conduct observations during ongoing daytime operations

and nighttime ramp-ups of the airgun array. 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 mealtimes and bathroom breaks, it is sometimes difficult to have two PSVOs on effort, but at least one PSVO will be on watch during bathroom breaks and mealtimes. PSVOs will be on duty in shifts of no longer than four hours in duration.

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). 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 observer 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 the PSVOs observe marine mammals within or about to enter the designated EZ, the Langseth will immediately power-down or shut-down the airguns 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 minutes for species with shorter dive durations (small odontocetes and pinnipeds) or 30 minutes for species with longer dive durations (mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, killer, and beaked whales).

Passive Acoustic Monitoring

Passive Acoustic Monitoring (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 conjunction with 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. The PSAO will monitor the system in real time so that he/she can advise the PSVO when cetaceans are detected. When bearings (primary and mirror-image) to calling cetacean(s) are determined, the bearings will be relayed to the visual observer to help him/her sight the calling animal(s).

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). L-DEO will deploy the array from a winch located on the back deck. A deck cable will connect the tow cable to the electronics unit in the main computer lab 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 kilohertz.

One PSAO, an expert bioacoustician with primary responsibility for PAM, will be aboard the Langseth in addition to the four PSVOs. The PSAO will monitor the towed hydrophones 24 hours per day 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 both the primary and back-up hydrophone arrays during operations. The primary PAM streamer on the Langseth is a digital 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. The other PSVOs 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 on duty 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. 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.

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 and turtles in the area where the seismic study is conducted.

4. Information to compare the distance and distribution of marine mammals and turtles 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.

Reporting

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 and turtles 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.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), L-DEO shall immediately cease the specified activities and immediately report the incident to the Acting Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and ITP.Cody@noaa.gov and the NMFS Pacific Islands Regional Stranding Coordinator at 808-944-2269 (David.Schofield@noaa.gov). The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;

- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

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

In the event that L-DEO discovers an injured or dead marine mammal, and the lead PSVO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), L-DEO will immediately report the incident to the Acting Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and ITP.Cody@noaa.gov and the NMFS Pacific Islands Regional Stranding Coordinator at 808-944-2269 (David.Schofield@noaa.gov). The report must include the same information identified in

the paragraph above this section. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with L-DEO to determine whether modifications in the activities are appropriate.

In the event that L-DEO discovers an injured or dead marine mammal, and the lead PSVO determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), L-DEO will report the incident to the Acting Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and ITP.Cody@noaa.gov and the NMFS Pacific Islands Regional Stranding Coordinator at 808-944-2269 (David.Schofield@noaa.gov), within 24 hours of the discovery. L-DEO will provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS.

Estimated Take by Incidental Harassment

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

NMFS anticipates and authorizes take by Level B harassment only as a result of the marine geophysical survey in the northwestern Pacific Ocean. 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 1,216 km (755.6 mi) of survey lines on the Shatsky Rise in the northwestern Pacific Ocean.

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.

Density data on 18 marine mammal species in the Shatsky Rise area are available from two sources using conventional line transect methods: Japanese sighting surveys

conducted since the early 1980s, and fisheries observers in the high-seas driftnet fisheries during 1987–1990 (see Table 3 in L-DEO's application).

For the 16 other marine mammal species that could be encountered in the proposed survey area, data from the western North Pacific right whale are not available (see Table 3 in L-DEO's application). L-DEO is not aware of any density estimates for three of those species—Hubb's (Mesoplodon carlhubbsi), Stejneger's (Mesoplodon stejnegeri), and gingko-toothed beaked whales (Mesoplodon ginkgodens). For the remaining 13 species out of the 16, (see Table 3 in L-DEO's application), density estimates are available from other areas of the Pacific: 11 species from the offshore stratum of the 2002 Hawaiian Islands survey (Barlow, 2006) and two species from surveys of the California Current ecosystem off the U.S. west coast between 1991 and 2005 (Barlow and Forney, 2007). Those estimates are based on standard line-transect protocols developed by NMFS' Southwest Fisheries Science Center (SWFSC).

Densities for 14 species are available from Japanese sighting surveys in the Shatsky Rise survey area. Miyashita (1993a) provided estimates for six dolphin species in this area that have been taken in the Japanese drive fisheries. The densities used here are Miyashita's (1993a) estimates for the Eastern offshore survey area (30–42° N, 145°–180° E). Kato and Miyashita (1998) provided estimates for sperm whale densities from Japanese sightings data during 1982 to 1996 in the western North Pacific (20–50° N, 130°–180° E), and Hakamada et al. (2004) provided density estimates for sei whales during August through September in the JARPN II sub-areas 8 and 9 (35–50º N, 150–170º E excluding waters in the Exclusive Economic Zone of Russia) during 2002 and 2003. L-DEO used density estimates during 1994 through 2007 for minke whales at 35–

40º N, 157–170º E from Hakamada et al. (2009), density estimates during 1998 through 2002 for Bryde's whales at 31–43º N, 145–165º E from Kitakado et al. (2008), and density estimates during 1994–2007 for blue, fin, humpback, and North Pacific right whales at 31–51ºN, 140–170ºE from Matsuoka et al. (2009).

For four species (northern fur seal, Dall's porpoise, Pacific white-sided dolphin (Lagenorhynchus obliquidens), northern right-whale dolphin (Lissodelphis borealis)), estimates of densities in the Shatsky Rise area are available from sightings data collected by observers in the high-seas driftnet fisheries during 1987 through 1990 (Buckland et al., 1993). Those data were analyzed for 5° x 5° blocks, and the densities used here are from blocks for which available data overlap the proposed survey area. In general, those data represent the average annual density in the northern half of the Shatsky Rise survey area (35–40° N).

The densities mentioned above had been corrected by the original authors for detectability bias and, with the exception of Kitakado et al. (2008) and Hakamada et al. (2009), for availability bias. Detectability bias is associated with diminishing sightability with increasing lateral distance from the track line [$f(0)$]. Availability bias refers to the fact that there is less than a 100 percent probability of sighting an animal that is present along the survey track line, and it is measured by $g(0)$.

There is some uncertainty about the accuracy of the density data from the Japanese Whale Research Program under Special Permit (JARPN/JARPN II). For example, The available densities in Miyashita (1993a) and Buckland et al. (1993) are from the 1980s; although these densities represent the best available information for the Shatsky Rise area at present, they will be biased if abundance or distributions of those species have changed

since the data were collected. Therefore, there is uncertainty with respect to the expected marine mammal densities during this time. However, the approach used here is based on the best available data.

The estimated numbers of individuals potentially exposed are based on the 160-dB re: 1 μPa criterion for all cetaceans (see Table 2 in this notice). It is assumed that marine mammals exposed to airgun sounds that strong might change their behavior sufficiently to be considered "taken by harassment."

L-DEO's estimates of exposures to various sound levels assume that the proposed surveys will be completed; in fact, the ensonified areas calculated using the planned number of line-kilometers have been increased by 25 percent to accommodate turns, lines that may need to be repeated, equipment testing, etc. As is typical during 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 exclusion zone will result in the shutdown of seismic operations as a mitigation measure. Thus, the following estimates of the numbers of marine mammals potentially exposed to 160-dB re:1 μPa sounds are precautionary, and probably overestimate the actual numbers of marine mammals that might be involved. These estimates 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 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 majority of seismic lines are widely spaced in the survey area, so few individual mammals would be exposed numerous times during the survey. The area including overlap is only 1.01 times the area excluding overlap, so a marine mammal that stayed in the survey area during the entire survey could be exposed only once. However, it is unlikely that a particular animal would stay in the area during the entire survey.

The number of different individuals potentially exposed to received levels greater than or equal to 160 re: 1 μPa was calculated by multiplying:

(1) The expected species density, times;

(2) The anticipated area to be ensonified to that level during airgun operations excluding overlap, which is approximately 10,971 square kilometers (km^2) (4,235.9 square miles (mi^2)).

The area expected to be ensonified was determined by entering the planned survey lines into a MapInfo GIS, using the GIS to identify the relevant areas by "drawing" the applicable 160-dB buffer (see Table 1 in this document) around each seismic line, and then calculating the total area within the buffers. Areas of overlap were included only once when estimating the number of individuals exposed. Applying this approach, approximately 9,229 km^2 (3,563 mi^2) (11,536 km^2; 4, 454 mi^2 including the 25 percent contingency) would be within the 160-dB isopleth on one or more occasions during the survey. Because this approach does not allow for turnover in the mammal populations in the study area during the course of the survey, the actual number of individuals exposed

could be underestimated. However, 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.

The total 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 during the survey is 7,375 (see Table 2). That total includes 74 baleen whales, 39 of which are endangered: 5 humpback whales or 0.53% of the regional population, 21 sei whales (0.21%), 9 fin whales (0.05%), and 4 blue whales (0.13%). In addition, 12 sperm whales (also listed as endangered under the ESA) or 0.04% of the regional population could be exposed during the survey, and 108 beaked whales including Cuvier's, Longman's, Baird's, and Blainville's beaked whales. Most (96 percent) of the cetaceans potentially exposed are delphinids; short-beaked common, striped, pantropical spotted, and Pacific white-sided dolphins are estimated to be the most common species in the area, with estimates of 3,569 (0.12% of the regional population), 1,374 (0.24%), 812 (0.19%), and 420 (0.04%) exposed to greater than or equal to 160 dB re: 1 μPa, respectively.

Table 2. Estimates of the possible numbers of marine mammals exposed to different sound levels during L-DEO's seismic survey in the northwestern Pacific Ocean during March through May, 2012.

Species	Estimated Number of Individuals Exposed to Sound Levels ≥ 160 dB re: 1 μPa[1]	Requested or Adjusted Take Authorization	Approximate Percent of Regional Population[3]
North Pacific right whale	0	2[2]	0.23
Humpback whale	5	5	0.53
Minke whale	29	29	0.12
Bryde's whale	6	6	0.03
Sei whale	21	21	0.21
Fin whale	9	9	0.05
Blue whale	4	4	0.13
Sperm whale	12	12	0.04
Pygmy sperm whale	37	37	N.A.
Dwarf sperm whale	90	90	<0.01
Cuvier's beaked whale	78	78	0.39
Baird's beaked whale	10	10	N.A.
Longman's beaked whale	5	18[3]	N.A.
Blainville's beaked whale	15	15	0.06
Rough-toothed dolphin	36	36	0.02
Bottlenose dolphin	277	277	0.16
Pantropical spotted dolphin	812	812	0.19
Spinner dolphin	10	32[2]	<0.01
Striped dolphin	1374	1374	0.24
Fraser's dolphin	53	286[2]	0.02
Short-beaked common dolphin	3569	3569	0.12
Pacific white-sided dolphin	420	420	0.04
Northern right whale dolphin	5	5	<0.01
Risso's dolphin	125	125	0.01
Melon-headed whale	15	89[2]	0.03
False killer whale	24	24	0.15
Killer whale	2	73	0.02
Short-finned pilot whale	58	65[2]	0.11
Dall's porpoise	253	253	0.02
Northern fur seal	21	21	<0.01

[1] Estimates are based on densities in Table 3 of L-DEO's application and an ensonified area (including 25% contingency 11,536 km²).
[2] Requested Take Authorization increased to mean group size from density sources in Table 3 of L-DEO's application.
[3] Regional population size estimates are from Table 4 of L-DEO's application; NA means not available.

Encouraging and Coordinating Research

L-DEO and NSF will coordinate the planned marine mammal monitoring program associated with the seismic survey in the northwestern Pacific Ocean with other parties that may have interest in the area and/or be conducting marine mammal studies in the same region during the seismic survey.

Negligible Impact and Small Numbers Analysis and Determination

NMFS has defined ‘‘negligible impact’’ as “...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.’’ In making a negligible impact determination, NMFS considers:

(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.

For reasons stated previously in this document, the specified activities associated with the marine seismic survey are not likely to cause permanent threshold shift (PTS), or other non-auditory injury, serious injury, or death because:

(1) The likelihood that, given sufficient notice through relatively slow ship speed, marine mammals are expected to move away from a noise source that is annoying prior to its becoming potentially injurious;

(2) The potential for temporary or permanent hearing impairment is relatively low and would likely be avoided through the incorporation of the required monitoring and mitigation measures (described previously in this document);

(3) The fact that cetaceans would have to be closer than 940 m (3,084 ft) in deep water when the 36-airgun array is in use at 9 m (29.5 ft) tow depth, and 40 m (131.2 ft) in deep water when the single airgun is in use at 9 m from the vessel to be exposed to levels of sound believed to have even a minimal chance of causing PTS; and

(4) The likelihood that marine mammal detection ability by trained PSVOs is high at close proximity to the vessel.

No injuries, serious injuries, or mortalities are anticipated to occur as a result of the L-DEO's marine seismic survey, and none are authorized by NMFS. NMFS anticipates that only short-term behavioral disturbance would occur due to the brief duration of the survey activities. Table 2 of this document outlines the number of requested Level B harassment takes that are anticipated as a result of these activities. Due to the nature, degree, and context of Level B (behavioral) harassment anticipated and described (see "Potential Effects on Marine Mammals" section in this notice), the activity is not expected to impact rates of recruitment or survival for any affected species or stock. Additionally, the seismic survey will not adversely impact marine mammal habitat.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (i.e., 24 hour cycle). Behavioral reactions to noise exposure

(such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall et al., 2007). While seismic operations are anticipated to occur on consecutive days, the entire duration of the survey is not expected to last more than approximately 23 days (i.e., 7 days of seismic operations, 16 days of transit) and the Langseth will be continuously moving along planned tracklines that are geographically spread-out. Therefore, the seismic survey will be increasing sound levels in the marine environment in a relatively small area surrounding the vessel, which is constantly travelling over far distances, for a relatively short time period (i.e., one week) in the study area.

Of the 34 marine mammal species under NMFS' jurisdiction that are known to occur or likely to occur in the study area, six of these species are listed as endangered under the ESA: the blue, fin, humpback, north Pacific right, sei, and sperm whales. These species are also categorized as depleted under the MMPA. L-DEO has requested authorized take for the six listed species. To protect these animals (and other marine mammals in the study area), L-DEO must cease or reduce airgun operations if animals enter designated zones. No injury, serious injury, or mortality is expected to occur, and due to the nature, degree, and context of the Level B harassment anticipated, the activity is not expected to impact rates of recruitment or survival. Further, the activity would not take place in areas of significance for marine mammal feeding, resting, breeding, or calving.

As mentioned previously, NMFS estimates that 30 species of marine mammals under its jurisdiction could be potentially affected by Level B harassment over the course of the IHA. As stated previously, L-DEO did not request and NMFS did not authorize take of

four species: pygmy killer whale or ginkgo-toothed, Stejneger's, or Hubb's beaked whales; because of the low likelihood of encountering these species during the cruise.

For each species, these numbers are small (each, less than one percent) relative to the regional population size. NMFS provided the population estimates for the marine mammal species that may be taken by Level B harassment in Table 2 of this document.

NMFS' practice has been to apply the 160 dB re: 1 μPa received level threshold for underwater impulse sound levels to determine whether take by Level B harassment occurs. Southall et al. (2007) provides a severity scale for ranking observed behavioral responses of both free-ranging marine mammals and laboratory subjects to various types of anthropogenic sound (see Table 4 in Southall et al. [2007]).

NMFS has determined, provided that the aforementioned mitigation and monitoring measures are implemented, that the impact of conducting a marine seismic survey on the Shatsky Rise in the northwestern Pacific Ocean, March to May, 2012, 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. See Table 2 in this document for the requested authorized take numbers 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 and the short duration of the research activities, have led NMFS to determine that this action will have a negligible impact on the species in the specified geographic region.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of

the mitigation and monitoring measures, NMFS finds that 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 of marine mammals; and that impacts to affected species or stocks of marine mammals have been mitigated to the lowest level practicable.

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

Section 101(a)(5)(D) of the MMPA 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 (Shatsky Rise, northwestern Pacific Ocean) 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 blue, fin, humpback, north Pacific right, sei, and sperm whales. L-DEO did not request take of endangered western north Pacific gray whales because of the low likelihood of encountering these species during the cruise.

Under section 7 of the ESA, NSF has initiated formal consultation with the NMFS', Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this proposed seismic survey. NMFS' Office of Protected Resources, Permits and Conservation Division, also initiated formal consultation under section 7 of the ESA with NMFS' Office of Protected Resources, Endangered Species Act

Interagency Cooperation Division, to obtain a Biological Opinion (BiOp) evaluating the effects of issuing an IHA for threatened and endangered marine mammals and, if appropriate, authorizing incidental take. In March, 2012, NMFS issued a BiOp and concluded that the action and issuance of the IHA are not likely to jeopardize the continued existence of blue, fin, humpback, north Pacific right, sei, and sperm whales. The BiOp also concluded that designated critical habitat for these species would not be affected by the survey. NSF and L-DEO must comply with the Relevant Terms and Conditions of the Incidental Take Statement (ITS) corresponding to NMFS' BiOp issued to NSF, L-DEO, and NMFS' Office of Protected Resources. L-DEO must also comply with the mitigation and monitoring requirements included in the IHA in order to be exempt under the ITS in the BiOp from the prohibition on take of listed endangered marine mammal species otherwise prohibited by section 9 of the ESA.

National Environmental Policy Act (NEPA)

To meet NMFS' National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) requirements for the issuance of an IHA to L-DEO, NMFS has prepared an Environmental Assessment (EA) titled "Issuance of an Incidental Harassment Authorization to the Lamont-Doherty Earth Observatory to Take Marine Mammals by Harassment Incidental to a Marine Geophysical Survey in the Northwest Pacific Ocean, March through May, 2012." This EA incorporated the NSF's Environmental Analysis Pursuant To Executive Order 12114 (NSF, 2010) and an associated report (Report) prepared by LGL Limited Environmental Research Associates (LGL) for NSF, titled, "Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Northwest Pacific Ocean, March – April, 2012," by reference pursuant to

40 CFR 1502.21 and NOAA Administrative Order (NAO) 216-6 § 5.09(d). NMFS provided relevant environmental information to the public through the notice for the proposed IHA (77 FR 4765, January 31, 2012) and has considered public comments received in response prior to finalizing its EA and deciding whether or not to issue a Finding of No Significant Impact (FONSI).

NMFS has concluded that issuance of an IHA would not significantly affect the quality of the human environment and has issued a FONSI. Because the NMFS has made a FONSI, it is not necessary to prepare an environmental impact statement for the issuance of an IHA to L-DEO for this activity. The EA and FONSI for this activity are available upon request (see ADDRESSES).

Authorization

As a result of these determinations, NMFS has issued an IHA to L-DEO for the take of small numbers of marine mammals, by Level B harassment incidental to conducting a marine geophysical survey in the northwest Pacific Ocean, March through May, 2012, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: April 25, 2012.

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Helen M. Golde,
Acting Director, Office of Protected Resources,
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[FR Doc. 2012-10495 Filed 04/30/2012 at 8:45 am; Publication Date: 05/01/2012]