Application to Modify Permit No. 1356

Permit No. 1356 – Inwater Research Group, Inc.: The existing permit allows the take of green, loggerhead, Kemp's ridley and hawksbill turtles to study the demographic composition and genetic origin of sea turtles within the Key West National Wildlife Refuge, Florida. The permit holder requests a modification to the permit to attach satellite transmitters to a subset of the green sea turtles already authorized to be captured. The Holder also requests authority to conduct sampling all months of the year and to modify their study area to include a 30 kilometer area south, west and north of the Marquesas Keys.

Dated: February 16, 2005.

Stephen L. Leathery,

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

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 101204B]

Small Takes of Marine Mammals Incidental to Specified Activities; Low-Energy Seismic Survey in the Southwest Pacific Ocean

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

ACTION: Notice of issuance of an incidental harassment authorization.

SUMMARY: In accordance with provisions of the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that an Incidental Harassment Authorization (IHA) to take small numbers of marine mammals, by harassment, incidental to conducting oceanographic seismic surveys in the southwestern Pacific Ocean (SWPO) has been issued to the Scripps Institution of Oceanography, (Scripps).

DATES: Effective from February 10, 2005, through February 9, 2006.

ADDRESSES: The authorization and application containing a list of the references used in this document may be obtained by writing to this address or by telephoning the contact listed here. The application is also available at: *http://www.nmfs.noaa.gov/prot1res/PR2/Small1Take/smalltake1info.htm#applications.*

FOR FURTHER INFORMATION CONTACT: Kenneth Hollingshead, Office of Protected Resources, NMFS, (301) 713–2289, ext 128.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Permission may 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 and that the permissible methods of taking and requirements pertaining to the monitoring and reporting of such takings are set forth. NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.''

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

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

Section 101(a)(5)(D) establishes a 45–day time limit for NMFS review of an application followed by a 30–day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny issuance of the authorization.

Summary of Request

On October 6, 2004, NMFS received an application from Scripps for the taking, by harassment, of several species of marine mammals incidental to conducting a low-energy marine seismic survey program during early 2005 in the SWPO. The overall area within which the seismic survey will occur is located between approximately 25° and 50°S, and between approximately 133° and 162.5°W. The survey will be conducted entirely in international waters. The purpose of the seismic survey is to collect the site survey data for a second Integrated Ocean Drilling Program transect to study the structure of the Eocene Pacific from the subtropics into the Southern Ocean. A future ocean-drilling program cruise (not currently scheduled) based on the data collected in the present program will better document and constrain the actual patterns of atmospheric and oceanic circulation on Earth at the time of extreme warmth in the early Eocene. Through the later ocean drilling program, it is anticipated that marine scientists will be able to (1) define the poleward extent of the sub-tropical gyre, (2) establish the position of the polar front, (3) determine sea-surface temperatures and latitudinal temperature gradient, (4) determine the width and intensity of the high-productivity zone associated with these oceanographic features, (5) characterize the water masses formed in the sub-polar region, (6) determine the nature of the zonal winds and how they relate to oceanic surface circulation, and (7) document the changes in these systems as climate evolves from the warm early Eocene to the cold Antarctic of the early Oligocene. As presently scheduled, the seismic survey will occur from approximately February 11, 2005 to March 21, 2005.

Description of the Activity

The seismic survey will involve one vessel. The source vessel, the *R/V Melville*, will deploy a pair of low-energy Generator-Injector (GI) airguns as an energy source (each with a discharge volume of 45 in^3), plus a 450–meter (m) (1476–ft) long, 48–channel, towed hydrophone streamer. As the airguns are towed along the survey lines, the receiving system will receive the returning acoustic signals. The survey program will consist of approximately 11,000 kilometer (km) (5940 nautical mile (nm)) of surveys, including turns. Water depths within the seismic survey area are 4000–5000 m (13,123–16,400 ft) with no strong topographic features. The GI guns will be operated en route between piston-coring sites, where bottom sediment cores will be collected. There will be additional operations associated with equipment testing, start-up, line changes, and repeat coverage of any areas where initial data quality is sub-standard.

The energy to the airguns is compressed air supplied by compressors on board the source vessel. Seismic pulses will be emitted at intervals of 6–10 seconds. At a speed of 7 knots (about 13 km/h), the 6–10 sec spacing corresponds to a shot interval of approximately 21.5–36 m (71–118 ft).

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

General-Injector Airguns

Two GI-airguns will be used from the *Melville* during the proposed program. These 2 GI-airguns have a zero to peak (peak) source output of 237 dB re 1 microPascal-m (7.2 bar-m) and a peak-to-peak (pk-pk) level of 243 dB (14.0 bar-m). However, these downward-directed source levels do not represent actual sound levels that can be measured at any location in the water. Rather, they represent the level that would be found 1 m (3.3 ft) from a hypothetical point source emitting the same total amount of sound as is emitted by the combined airguns in the airgun array. The actual received level at any location in the water near the airguns will not exceed the source level of the strongest individual source and actual levels experienced by any organism more than 1 m (3.3 ft) from any GI gun will be significantly lower.

Further, the root mean square (rms) received levels that are used as impact criteria for marine mammals (see Richardson *et al.*, 1995) are not directly comparable to these peak or pk-pk values that are normally used by acousticians to characterize source levels of airgun arrays. The measurement units used to describe airgun sources, peak or pk-pk decibels, are always higher than the rms decibels referred to in biological literature. For example, a measured received level of 160 dB rms in the far field would typically correspond to a peak measurement of about 170 to 172 dB, and to a pk-pk measurement of about 176 to 178 decibels, as measured for the same pulse received at the same location (Greene, 1997; McCauley *et al.* 1998, 2000). The precise difference between rms and peak or pk-pk values depends on the frequency content and duration of the pulse, among other factors. However, the rms level is always lower than the peak or pk-pk level for an airgun-type source.

The depth at which the sources are towed has a major impact on the maximum near-field output, because the energy output is constrained by ambient pressure. The normal tow depth of the sources to be used in this project is 2.0 m (6.6 ft), where the ambient pressure is approximately 3 decibars. This also limits output, as the 3 decibars of confining pressure cannot fully constrain the source output, with the result that there is loss of energy at the sea surface. Additional discussion of the characteristics of airgun pulses is provided in Scripps application and in previous **Federal Register** documents (see 69 FR 31792 (June 7, 2004) or 69 FR 34996 (June 23, 2004)).

Received sound levels have been modeled by L-DEO for two 105 in^3 GI guns, but not for the two 45 in^3 GI-guns, in relation to distance and direction from the airguns. The model does not allow for bottom interactions, and is therefore most directly applicable to deep water. Based on the modeling, estimates of the maximum distances from the GI guns where sound levels of 190, 180, 170, and 160 dB microPascal-m (rms) are predicted to be received are shown in Table 1. Because the model results are for the larger 105 in^3 guns, those distances are overestimates of the distances for the 45 in^3 guns.

TABLE 1. DISTANCES TO WHICH SOUND LEVELS 190, 180, 170, AND 160 DB MICROPASCAL-M (RMS) MIGHT BE RECEIVED FROM TWO 105 IN³ GI AIRGUNS, SIMILAR TO THE TWO 45 IN³ GI AIRGUNS THAT WILL BE USED DURING THE SEISMIC SURVEY IN THE SW PACIFIC OCEAN DURING FEBRUARY-MARCH 2005. DISTANCES ARE BASED ON MODEL RESULTS PROVIDED BY LAMONT-DOHERTY EARTH OBSERVATORY (L-DEO).,P0,8/9

ESTIMATED DISTANCES AT RECEIVED LEVELS (M/FT)

Water Depth >1000	190 dB 17/56	180 dB 54/177	170 dB 175/574	160 dB 510/1673

Some empirical data concerning the 180–, and 160–dB distances have been acquired for several airgun configurations, including two GI-guns, based on measurements during an acoustic verification study conducted by L-DEO in the northern Gulf of Mexico (GOM) from 27 May to 3 June 2003 (Tolstoy *et al.*, 2004). Although the results are limited, the data showed that water depth affected the radii around the airguns where the received level would be 180 dB re 1 microPa (rms), NMFS' current injury threshold safety criterion applicable to cetaceans (NMFS, 2000). Similar depth-related variation is likely in the 190–dB distances applicable to pinnipeds. Correction factors were developed and implemented for previous IHAs for activities with water depths less than 1000 m (3281 ft). However, the proposed airgun survey will occur in depths 4000–5000 m (13,123–16,400 ft). As a result, NMFS has determined correction factors are not necessary here since the L-DEO model has been shown to result in more conservative (i.e,. protective) impact zones than indicated by the empirical measurements. Therefore, the assumed 180- and 190–dB radii are 54 m (177 ft) and 17 m (56 ft), respectively. Considering that the 2 GI-airgun array is towed 21 m (69 ft) behind the *Melville* and the vessel is 85 m (270 ft) long, the forward aspect of the 180–dB isopleth (lines of equal pressure) at its greatest depth will not exceed approximately the mid-ship line of the *Melville*. At the water surface, an animal would need to be between the vessel and the 450–m (1476 ft) long hydrophone streamer to be within the 180–dB isopleth.

Bathymetric Sonar and Sub-bottom Profiler

In addition to the 2 GI-airguns, a multi-beam bathymetric sonar and a low-energy 3.5–kHz sub-bottom profiler will be used during the seismic profiling and continuously when underway.

Sea Beam 2000 Multi-beam Sonar – The hull-mounted Sea Beam 2000 sonar images the seafloor over a 120°–wide swath to 4600 m (15092 ft) under the vessel. In ''deep'' mode (400–1000 m

(1312–3281 ft), it has a beam width of 2°, fore-and-aft, uses very short (7–20 msec) transmit pulses with a 2–22 s repetition rate and a 12.0 kHz frequency sweep. The maximum source level is 234 dB microPa (rms).

Sub-bottom Profiler – The sub-bottom profiler is normally operated to provide information about the sedimentary features and the bottom topography that is simultaneously being mapped by the multi-beam sonar. The energy from the sub-bottom profiler is directed downward by a 3.5–kHz transducer mounted in the hull of the *Melville*. The output varies with water depth from 50 watts in shallow water to 800 watts in deep water. Pulse interval is 1 second (s) but a common mode of operation is to broadcast five pulses at 1–s intervals followed by a 5–s pause. The beamwidth is approximately 30° and is directed downward. Maximum source output is 204 dB re 1 microPa (800 watts) while normal source output is 200 dB re 1 microPa (500 watts). Pulse duration will be 4, 2, or 1 ms, and the bandwith of pulses will be 1.0 kHz, 0.5 kHz, or 0.25 kHz, respectively.

Although the sound levels have not been measured directly for the sub-bottom profiler used by the *Melville*, Burgess and Lawson (2000) measured sounds propagating more or less horizontally from a sub-bottom profiler similar to the Scripps unit with similar source output (i.e., 205 dB re 1 microPa m). For that profiler, the 160- and 180–dB re 1 microPa (rms) radii in the horizontal direction were estimated to be, respectively, near 20 m (66 ft) and 8 m (26 ft) from the source, as measured in 13 m (43 ft) water depth. The corresponding distances for an animal in the beam below the transducer would be greater, on the order of 180 m (591 ft) and 18 m (59 ft) respectively, assuming spherical spreading. Thus the received level for the Scripps sub-bottom profiler would be expected to decrease to 160 and 180 dB about 160 m (525 ft) and 16 m (52 ft) below the transducer, respectively, assuming spherical spreading. Corresponding distances in the horizontal plane would be lower, given the directionality of this source (30° beamwidth) and the measurements of Burgess and Lawson (2000).

Characteristics of Airgun Pulses

Discussion of the characteristics of airgun pulses was provided in several previous **Federal Register** documents (see 69 FR 31792 (June 7, 2004) or 69 FR 34996 (June 23, 2004)) and is not repeated here. Reviewers are referred to those documents for additional information.

Comments and Responses

A notice of receipt and request for 30–day public comment on the application and proposed authorization was published on December 3, 2004 (69 FR 70236). During the 30–day public comment period, NMFS received two comments. One commenter expressed the opinion that marine mammals should not be killed and that these killings are not small. As noted in this document, NMFS believes that no marine mammals are likely to be seriously injured or killed as a result of this L-DEO conducting seismic surveys.The concerns of the second commenter, the Center for Regulatory Effectiveness (CRE), are discussed here.

Comment 1: There is no scientific basis for the use of 190, 180, 170, and 160 dB micro-Pascal (RMS) as criteria for potential injury to marine mammals from seismic operations. NMFS uses these criteria along with L-DEO (Lamont-Doherty Earth Observatory) modeling, to determine the safety (shut-down) radii for seismic surveys. The comment states that those criteria are arbitrary and without scientific basis, were established without external peer review or published reports, and were not based on empirical data.

Response: NMFS disagrees that there is no factual or scientific basis to support the 190, 180, and 160 dB thresholds (we note that 170 dB is not used by NMFS). At the same time we recognize the limitations of these thresholds and, in the interest of transparency, acknowledge and disclose them. These limitations largely stem from the data gaps for many species of marine mammals, individual intra-species variability, and the difficulties inherent in conducting field studies in this area of inquiry (both logistic and ethical). NMFS makes its data, and the analysis of these data, available to the public and solicits public comment. However, there are factual studies that support the threshold values used here.

The 160–dB isopleth for onset of Level B (behavioral) harassment is supported by research conducted by Malme *et al.* (1983, 1984) in their study on the California gray whale when exposed to seismic sounds. They found that migrating gray whales showed definite avoidance reactions and other behavioral changes when exposed to seismic pulses with received levels exceeding about 160 dB re 1 micro Pa (rms). The received levels at which 10 percent, 50 percent and 90 percent of the whales exhibited avoidance were estimated to be 164, 170, and 180 dB (Malme *et al.*, 1989; Richardson *et al.*, 1995).

More recently, McCauley *et al.* (1998) documented localized avoidance by humpback whales of both the seismic array and a single airgun (16–gun 2678–in^3 array and a single 20 in^3 airgun with a source level 227 dB re 1 μPa-m (p-p)). The standoff range (*i.e.*, the closest point of approach of the airgun to the whales) corresponded to received levels around 140 dB re 1 μPa. The initial avoidance response generally occurred at distances of 5 to 8 km (2.7 to 4.3 nm) from the airgun array and 2 km (1.0 nm) from the single gun, with estimated received levels at 140 dB and 143 dB re 1 μPa rms, respectively. However, some individual humpback whales, especially males, approached the vessel within distances 100 to 400 m (328 to 1312 ft), where the maximum received level was 179 dB re 1 μPa rms.

With respect to the 180 and 190 dB thresholds, data that are now available imply that, at least for dolphins, temporary threshold shift (TTS)in marine mammals is unlikely to occur unless the dolphins are exposed to airgun pulses stronger than 180 dB re 1 microPa (rms). However, safety zones must be implemented to protect those species believed to be most sensitive to low-frequency seismic noise: mysticete whales, sperm whales, and likely beaked whales (although beaked whales' best hearing is at significantly higher frequencies than low frequency seismic, it is possible that non-auditory injury may occur at lower sound pressure levels). As a result, NMFS has established the 180- and 190–dB safety zones based on the most sensitive species at the estimated best hearing frequencies. If information is available that sensitive species will not be within the affected area, or empirical data are presented that marine mammal stocks within the affected area do not have hearing capabilities within the source frequencies, then the appropriate safety zones might be reduced in size.

In some cases mitigation safety zones are perhaps larger than necessary to avoid Level A harassment of a particular species or the mitigation measures are one-size-fits-all in nature. This reflects the different sensitivities of affected species and the lack of data. Where different mitigation measures for different species are not practical, NMFS manages for the most sensitive species when multiple species are present. The safety zone for this seismic survey also affords the applicant a set of mitigation measures that can be practically implemented and will promote enforceability of the IHA. In this manner the applicant can move forward with the project in a timely manner and NMFS' legal mandate is satisfied.

NMFS is striving to improve the quality of the information it relies upon. We are developing sound exposure guidelines that will incorporate the current state of knowledge and take into account variations based on sound source, species type, and energy level. These guidelines will guide agency decisions and give the regulated communities and the public better information for planning, enforcement, and understanding. NMFS expects these guidelines to reflect the evolving understanding and appreciation of how sound affects marine mammals. As part of the process, NMFS has announced its intent to prepare an environmental impact statement and initiated public scoping to fully involve the public (70 FR 1871 (January 11, 2005)). The science underlying those guidelines will undergo external peer review.

Comment 2: The comment states there is no basis for correlating the effects, if any, on marine mammals of sonar and seismic operations.

Response: NMFS agrees that the properties of seismic and sonar are quite different and will take that into account when developing its acoustic guidelines.

Comment 3: NMFS' reliance on the L-DEO propagation model to determine the safety (shut-down) radii for seismic operations is unjustified and unsupported. NMFS has stated that for deep water the L-DEO model overestimates the received sound levels at a given distance. The L-DEO model is also inappropriate for use in shallow and intermediate depths because it cannot account for bottom interactions with sound waves.

Response: We have previously acknowledged the limitations of the model, as has the applicant. The acoustic verification/ calibration study in May/June 2003 in the GOM showed that water depth affected sound propagation (and, accordingly, the size of the safety radii). As a result, correction factors were developed for water depths 100–1000 m (328–3281 ft) and less than 100 m (328 ft). Those correction factors are not relevant for this survey, which will take place in water depths between 4000 and 5000 m (13123 and 16404 ft). Empirical data indicate that for water deeper than 1000 m (3281 ft), L-DEO's model tends to overestimate the received sound levels at any given distance (Tolstoy *et al.*, 2004). Pending acquisition of additional empirical data, Scripps' safety radii will be the values predicted by the model. This approach will ensure that marine mammals are not inadvertently exposed to sound levels greater than what were calculated in the GOM verification study.

Another alternative for estimating propagation would be to conduct simple calculations similar to those found in the Minerals Management Service's (MMS) Environmental Assessment for Geological and Geophysical Seismic Surveys in the GOM. This methodology is illustrated in Appendix C of that document (available at *http://www.gomr.mms.gov/homepg/regulate/environ/nepa/2004–054.pdf*). NMFS believes this methodology would need to be improved prior to use for incidental take authorizations because it does not take into account the fact that marine mammals dive into deeper water where the sound fields normally propagate to greater distances than at the surface. Similarly, using simple propagation logarithms (e.g., Lr = Ls- 20 Log R for deep water propagation) also has shortcomings, in that they overestimate horizontal propagation (seismic airgun arrays project sounds towards the bottom and not horizontally). As a result, until improved models are developed, NMFS believes that using the L-DEO model, with fully explained correction factors where necessary (shallow and intermediate water depths) provides a reasonable methodology for calculating the zones of impact from vertically propagating seismic arrays.

Comment 4: According to the abstract of the calibration study report (Tolstoy *et al.*, 2004)), ''Received [sound] levels in deep water were lower than anticipated based on [L-DEO] modeling, and in shallow water they were higher.'' In other words, the L-DEO model is inaccurate and unreliable in deep and shallow water.

Response: The L-DEO model is a general one that does not take into account the variation in propagation characteristics for the specific water bodies. In the GOM, sound propagation levels in deep water were lower and in shallow water were higher than that estimated by the L-DEO model. Under the MMPA and ESA, NMFS is charged with using the best information available. To the best of NMFS' knowledge, the L-DEO model provides a practical alternative to the use of standard propagation and attenuation calculations. Therefore, a more accurate statement would be that in that part of the GOM received sound levels in deep water were lower than anticipated based on the L-DEO model, and in shallow water they were higher the L-DEO model. Without making acoustic propagation measurements in advance of conducting seismic in each operating area, conservative estimates of sound propagation and attenuation were made. For this Scripps' seismic survey, the *R/V Melville* will conduct approximately 11,000 kilometers (km) (5940 nautical miles (nm)) of straight line seismic transects during the survey. Stopping the vessel to calibrate sound speed profiles for a particular water mass body, while possible, would result in increased costs through time and additional personnel and equipment needed onboard the *R/V Melville*. As an alternative, Scripps erred on the side of marine mammals protection and adopted conservative estimates for sound attenuation to the 160-, 180-, and 190–dB isopleths. For this cruise, NMFS has adopted those conservative estimates.

*Comment 5:*To the best of CRE's knowledge, the L-DEO model is not publically available, and NMFS has not demonstrated that it is sufficiently accurate and reliable to use. If NMFS intends to continue to use or rely on the L-DEO model, then the Agency should: (1) make the model publically available for comment; (2) validate use of the model for all contexts in which NMFS uses or relies on it; and (3) document use of the model and its results for each specific application in question, and make that documentation available for public comment along with the application itself in sufficient detail to allow third parties to reproduce the model results. If there is some reason why NMFS must rely on models that cannot be disclosed, then the agency must perform, document and produce the ''especially vigorous robustness checks'' that NMFS performed on these models. CRE recommends that NMFS adopt the Environmental Protection Agency's (EPA) definition of ''especially rigorous robustness checks.'' If and when NMFS attempts to validate the L-DEO model, CRE recommends that NMFS follow EPA's model validation guidance. (EPA draft guidance is available at: *http://www.epa.gov/osp/crem/library/CREM%20Guidance%Draft%2012103.pdf*.

Response: The L-DEO model is available to the public by contacting L-DEO (see the L-DEO application for the address). In addition, the model is explained in Diebold (2004, unpublished). A copy of this article is available upon request (see **ADDRESSES**). The 2003 GOM seismic airgun calibration study referenced in this document (Tolstoy *et al.*, 2004) was the result of an IHA issued to L-DEO for seismic work in the GOM (68 FR 9991, March 3, 2003). That report has been cited in a number of recent authorizations, and Chapter 3 of that report has been available since mid–2004 on our homepage where seismic incidental take applications are posted. We consider all references cited in our **Federal Register** notices to be part of our administrative record. Whenever an article is not generally available publically, we strive to make a copy available.

Chapter 3 of the 2003 GOM 90–day monitoring report was also rewritten, submitted for publication, peer-reviewed and finally published in the AGU's Geophysical Research Letters (Tolstoy, M., J.B. Diebold, S.C. Webb, D.R. Bohnenstiehl, E. Chapp, R.C. Holmes, and M. Rawson. 2004. Broadband Calibration of the R/V Ewing Seismic Sources. Geophys. Res. Lett., 31, doi:10.1029/ 2004GL020234, 2004). This scientific article is publically available through subscription, scientific libraries, or Inter-Library loan.

As to other modeling approaches and software that could be used to verify or refute the L-DEO model, there are commercial products available, such as Bellhop, PE, and one called Nucleus that produce illustrations similar to the L-DEO model, but this latter product provides peak levels only, and has several of the same limitations contained in the L-DEO model. There are also publically available packages that include complex water column velocity structure, and seafloor interactions, but most of these have other kinds of limitations (e.g., typically, they do not include arrays of sound sources, and do not analyze for broadband frequencies).

Comment 6: The CRE believes that NMFS should be concerned only with biologically significant effects on marine mammals, citing as support National Research Council reports (NRC 2004, NRC 2000).

Response: NMFS' decisions are made in accordance with the relevant provisions of the MMPA and its implementing regulations. MMPA section 101(a)(5)(D) requires the Secretary to authorize the taking of marine mammals incidental to otherwise lawful activities, provided that the activity will have no more than a negligible impact on the affected species or stocks of marine mammals. ''Negligible impact'' is defined in 50 CFR 216.103 (repeated earlier in this document). This is the relevant standard for the Secretary's decision. Although the term ''biologically significant'' is not used, this concept is captured through application of NMFS' definition of ''negligible impact.''

Description of Habitat and Marine Mammals Affected by the Activity

A detailed description of the SWPO area and its associated marine mammals can be found in the Scripps application and a number of documents referenced in that application, and is not repeated here. Forty species of cetacean, including 31 odontocete (dolphins and small- and large-toothed whales) species and nine mysticete (baleen whales) species, are believed by scientists to occur in the southwest Pacific in the proposed seismic survey area. Table 2 in the Scripps application summarizes the habitat, occurrence, and regional population estimate for these species. A more detailed discussion of the following species is also provided in the application: Sperm whale, pygmy and dwarf sperm whales, southern bottlenose whale, Arnoux's beaked whale, Cuvier's beaked whale, Shepherd's beaked whale, Mesoplodont beaked whales (Andrew's beaked whale, Blainville's beaked whale, gingko-toothed whale, Gray's beaked whale, Hector's beaked whale, spade-toothed whale, strap-toothed whale), melon-headed whale, pygmy killer whale, false killer whale, killer whale, long-finned pilot whale, short-finned pilot whale, rough-toothed dolphin, bottlenose dolphin, pantropical spotted dolphin, spinner dolphin, striped dolphin, short-beaked common dolphin, hourglass dolphin, Fraser's dolphin, Risso's dolphin, southern right whale dolphin, spectacled porpoise, humpback whale, southern right whale, pygmy right whale, common minke whale, Antarctic minke whale. Bryde's whale, sei whale, fin whale and blue whale. Because the proposed survey area spans a wide range of latitudes (25–500 S), tropical, temperate, and polar species are all likely to be found there. The survey area is all in deep-water habitat but is close to oceanic island (Society Islands, Australes Islands) habitats, so both coastal and oceanic species might be encountered. However, abundance and density estimates of cetaceans found there are provided for reference only, and are not necessarily the same as those that likely occur in the survey area.

Five species of pinnipeds could potentially occur in the proposed seismic survey area: southern elephant seal, leopard seal, crabeater seal, Antarctic fur seal, and the sub-Antarctic fur seal. All are likely to be rare, if they occur at all, as their normal distributions are south of the Scripps survey area. Outside the breeding season, however, they disperse widely in the open ocean (Boyd, 2002; King, 1982; Rogers, 2002). Only three species of pinniped are known to wander regularly into the area (SPREP, 1999): the Antarctic fur seal, the sub-Antarctic fur seal, and the leopard seal. Leopard seals are seen are far north as the Cook Islands (Rogers, 2002).

More detailed information on these species is contained in the Scripps application, which is available at: *http://www.nmfs.noaa.gov/prot*l*res/PR2/Small*l*Take/smalltake*l*info.htm#applications*.

Potential Effects on Marine Mammals

The effects of noise on marine mammals are highly variable, and can be categorized as follows (based on Richardson *et al.*, 1995):

(1) The noise may be too weak to be heard at the location of the animal (i.e., lower than the prevailing ambient noise level, the hearing threshold of the animal at relevant frequencies, or both);

(2) The noise may be audible but not strong enough to elicit any overt behavioral response;

(3) The noise may elicit reactions of variable conspicuousness and variable relevance to the well being of the marine mammal; these can range from temporary alert responses to active avoidance reactions such as vacating an area at least until the noise event ceases;

(4) Upon repeated exposure, a marine mammal may exhibit diminishing responsiveness (habituation), or disturbance effects may persist; the latter is most likely with sounds that are highly variable in characteristics, infrequent and unpredictable in occurrence, and associated with situations that a marine mammal perceives as a threat;

(5) Any anthropogenic noise that is strong enough to be heard has the potential to reduce (mask) the ability of a marine mammal to hear natural sounds at similar frequencies, including calls from conspecifics, and underwater environmental sounds such as surf noise;

(6) If mammals remain in an area because it is important for feeding, breeding or some other biologically important purpose even though there is chronic exposure to noise, it is possible that there could be noise-induced physiological stress; this might in turn have negative effects on the well-being or reproduction of the animals involved; and

(7) Very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity. In terrestrial mammals, and presumably marine mammals, received sound levels must far exceed the animal's hearing threshold for there to

be any TTS in its hearing ability. For transient sounds, the sound level necessary to cause TTS is inversely related to the duration of the sound. Received sound levels must be even higher for there to be risk of permanent hearing impairment. In addition, intense acoustic or explosive events may cause trauma to tissues associated with organs vital for hearing, sound production, respiration and other functions. This trauma may include minor to severe hemorrhage.

Effects of Seismic Surveys on Marine Mammals

The Scripps' application provides the following information on what is known about the effects on marine mammals of the types of seismic operations planned by Scripps. The types of effects considered here are (1) tolerance, (2) masking of natural sounds, (2) behavioral disturbance, and (3) potential hearing impairment and other non-auditory physical effects (Richardson *et al.*, 1995). Given the relatively small size of the airguns planned for the present project, the effects are anticipated to be considerably less than would be the case with a large array of airguns. Scripps and NMFS believe it is very unlikely that there would be any cases of temporary or especially permanent hearing impairment, or non-auditory physical effects. Also, behavioral disturbance is expected to be limited to distances less than 500 m (1640 ft), the zone calculated for 160 dB or the onset of Level B harassment. Additional discussion on species-specific effects can be found in the Scripps application.

Tolerance

Numerous studies (referenced in Scripps, 2004) have shown that pulsed sounds from airguns are often readily detectable in the water at distances of many kilometers, but that marine mammals at distances more than a few kilometers from operating seismic vessels often show no apparent response. That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. However, most measurements of airgun sounds that have been reported concerned sounds from larger arrays of airguns, whose sounds would be detectable farther away than that planned for use in the proposed survey. Although various baleen whales, toothed whales, and pinnipeds have been shown to react behaviorally to airgun pulses under some conditions, at other times mammals of all three types have shown no overt reactions. In general, pinnipeds and small odontocetes seem to be more tolerant of exposure to airgun pulses than are baleen whales. Given the relatively small and low-energy airgun source planned for use in this project, mammals are expected to tolerate being closer to this source than would be the case for a larger airgun source typical of most seismic surveys.

Masking

Masking effects of pulsed sounds (even from large arrays of airguns) on marine mammal calls and other natural sounds are expected to be limited (due in part to the small size of the GI airguns), although there are very few specific data on this. Given the small acoustic source planned for use in the SWPO, there is even less potential for masking of baleen or sperm whale calls during the present research than in most seismic surveys (Scripps, 2004). GI-airgun seismic sounds are short pulses generally occurring for less than 1 sec every 6–10 seconds or so. The 6–10 sec spacing corresponds to a shot interval of approximately 21.5–36 m (71–118 ft). Sounds from the multi-beam sonar are very short pulses, occurring for 7–20 msec once every 2 to 22 sec, depending on water depth.

Some whales are known to continue calling in the presence of seismic pulses. Their calls can be heard between the seismic pulses (Richardson *et al.*, 1986; McDonald *et al.*, 1995, Greene *et al.*, 1999). Although there has been one report that sperm whales cease calling when exposed to pulses from a very distant seismic ship (Bowles *et al.*, 1994), a recent study reports that sperm whales continued calling in the presence of seismic pulses (Madsen *et al.*, 2002). Given the relatively small source planned for use during this survey, there is even less potential for masking of sperm whale calls during the present study than in most seismic surveys. Masking effects of seismic pulses are expected to be negligible in the case of the smaller odontocete cetaceans, given the intermittent nature of seismic pulses and the relatively low source level of the airguns to be used in the SWPO. Also, the sounds important to small odontocetes are predominantly at much higher frequencies than are airgun sounds.

Most of the energy in the sound pulses emitted by airgun arrays is at low frequencies, with strongest spectrum levels below 200 Hz and considerably lower spectrum levels above 1000 Hz. These low frequencies are mainly used by mysticetes, but generally not by odontocetes or pinnipeds. An industrial sound source will reduce the effective communication or echolocation distance only if its frequency is close to that of the marine mammal signal. If little or no overlap occurs between the industrial noise and the frequencies used, as in the case of many marine mammals relative to airgun sounds, communication and echolocation are not expected to be disrupted. Furthermore, the discontinuous nature of seismic pulses makes significant masking effects unlikely even for mysticetes.

A few cetaceans are known to increase the source levels of their calls in the presence of elevated sound levels, or possibly to shift their peak frequencies in response to strong sound signals (Dahlheim, 1987; Au, 1993; Lesage *et al.*, 1999; Terhune, 1999; as reviewed in Richardson *et al.*, 1995). These studies involved exposure to other types of anthropogenic sounds, not seismic pulses, and it is not known whether these types of responses ever occur upon exposure to seismic sounds. If so, these adaptations, along with directional hearing, pre-adaptation to tolerate some masking by natural sounds (Richardson *et al.*, 1995) and the relatively low-power acoustic sources being used in this survey, would all reduce the importance of masking marine mammal vocalizations.

Disturbance by Seismic Surveys

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous dramatic changes in activities, and displacement. However, there are difficulties in defining which marine mammals should be counted as taken by harassment. For many species and situations, scientists do not have detailed information about their reactions to noise, including reactions to seismic (and sonar) pulses. Behavioral reactions of marine mammals to sound are difficult to predict. Reactions to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors. If a marine mammal does react to an underwater sound by changing its behavior or moving a small distance, the impacts of the change may not rise to the level of a disruption of a behavioral pattern. However, if a sound source would displace marine mammals from an important feeding or breeding area, such a disturbance may constitute Level B harassment under the MMPA. Given the many uncertainties in predicting the quantity and types of impacts of noise on marine mammals, it is appropriate to resort to estimating how many mammals may be present within a particular distance of industrial activities or exposed to a particular level of industrial sound. With the possible exception of beaked whales, NMFS believes that this is a conservative approach and likely overestimates the numbers of marine mammals that are affected in some biologically important manner.

The sound exposure criteria used to estimate how many marine mammals might be harassed behaviorally by the seismic survey are based on behavioral observations during studies of several species. However, information is lacking for many species. Detailed information on potential disturbance effects on baleen whales, toothed whales, and pinnipeds can be found in Scripps's SWPO application and its Appendix A.

Hearing Impairment and Other Physical Effects

Temporary or permanent hearing impairment is a possibility when marine mammals are exposed to very strong sounds, but there has been no specific documentation of this for marine mammals exposed to airgun pulses. Based on current information, NMFS precautionarily sets impulsive sounds equal to or greater than 180 and 190 dB re 1 microPa (rms) as the exposure thresholds for onset of Level A harassment for cetaceans and pinnipeds, respectively (NMFS, 2000). Those criteria have been used in setting the safety (shut-down) radii for seismic surveys. As discussed in the Scripps application and summarized here.

1. The 180–dB criterion for cetaceans is probably quite precautionary, i.e., lower than necessary to avoid TTS let alone permanent auditory injury, at least for delphinids.

2. The minimum sound level necessary to cause permanent hearing impairment is higher, by a variable and generally unknown amount, than the level that induces barely-detectable TTS.

3. The level associated with the onset of TTS is considered to be a level below which there is no danger of permanent damage.

Because of the small size of the two 45 in^3 GI-airguns, along with the planned monitoring and mitigation measures, there is little likelihood that any marine mammals will be exposed to sounds sufficiently strong to cause even the mildest (and reversible) form of hearing impairment. Several aspects of the planned monitoring and mitigation measures for this project are designed to detect marine mammals occurring near the 2 GI-airguns (and bathymetric sonar), and to avoid exposing them to sound pulses that might (at least in theory) cause hearing impairment. In addition, research and monitoring studies on gray whales, bowhead whales and other cetacean species indicate that many cetaceans are likely to show some avoidance of the area with ongoing seismic operations. In these cases, the avoidance responses of the animals themselves will reduce or avoid the possibility of hearing impairment.

Non-auditory physical effects may also occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that theoretically might occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. It is possible that some marine mammal species (i.e., beaked whales) may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds. However, Scripps and NMFS believe that it is especially unlikely that any of these non-auditory effects would occur during the proposed survey given the small size of the acoustic sources, the brief duration of exposure of any given mammal, and the planned mitigation and monitoring measures. The following paragraphs discuss the possibility of TTS, permanent threshold shift (PTS), and non-auditory physical effects.

TTS

TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter, 1985). When an animal experiences TTS, its hearing threshold rises and a sound must be stronger in order to be heard. TTS can last from minutes or hours to (in cases of strong TTS) days. Richardson *et al.* (1995) note that the magnitude of TTS depends on the level and duration of noise exposure, among other considerations. For sound exposures at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the noise ends. Little data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals.

For toothed whales exposed to single short pulses, the TTS threshold appears to be, to a first approximation, a function of the energy content of the pulse (Finneran *et al.*, 2002). Given the available data, the received level of a single seismic pulse might need to be on the order of 210 dB re 1 microPa rms (approx. 221 226 dB pk pk) in order to produce brief, mild TTS. Exposure to several seismic pulses at received levels near 200 205 dB (rms) might result in slight TTS in a small odontocete, assuming the TTS threshold is (to a first approximation) a function of the total received pulse energy (Finneran *et al.*, 2002). Seismic pulses with received levels of 200 205 dB or more are usually restricted to a zone of no more than 100 m (328 ft) around a seismic vessel operating a large array of airguns. Because of the small airgun source planned for use during this project, such sound levels would be limited to distances within a few meters directly astern of the *Melville*.

There are no data, direct or indirect, on levels or properties of sound that are required to induce TTS in any baleen whale. However, TTS is not expected to occur during this survey given the small size of the source limiting these sound pressure levels to the immediate proximity of the vessel, and the strong likelihood that baleen whales would avoid the approaching airguns (or vessel) before being exposed to levels high enough for there to be any possibility of TTS.

TTS thresholds for pinnipeds exposed to brief pulses (single or multiple) have not been measured, although exposures up to 183 dB re 1 microPa (rms) have been shown to be insufficient to induce TTS in California sea lions (Finneran *et al.*, 2003). However, prolonged exposures show that some pinnipeds may incur TTS at somewhat lower received levels than do small odontocetes exposed for similar durations (Kastak *et al.*, 1999; Ketten *et al.*, 2001; Au *et al.*, 2000). For this research cruise therefore, TTS is unlikely for pinnipeds.

A marine mammal within a zone of less than 100 m (328 ft) around a typical large array of operating airguns might be exposed to a few seismic pulses with levels of ≥205 dB, and possibly more pulses if the mammal moved with the seismic vessel. Also, around smaller arrays, such as the 2 GI-airgun array proposed for use during this survey, a marine mammal would need to be even closer to the source to be exposed to levels greater than or equal to 205 dB. However, as noted previously, most cetacean species tend to avoid operating airguns, although not all individuals do so. In addition, ramping up airgun arrays, which is now standard operational protocol for U.S. and some foreign seismic operations, should allow cetaceans to move away from the seismic source and to avoid being exposed to the full acoustic output of the airgun array. Even with a large airgun array, it is unlikely that these cetaceans would be exposed to airgun pulses at a sufficiently high level for a sufficiently long period to cause more than mild TTS, given the relative movement of the vessel and the marine mammal. However, with a large airgun array, TTS would be more likely in any odontocetes that bow-ride or otherwise linger near the airguns. While bow-riding, odontocetes would be at or above the surface, and thus not exposed to strong sound pulses given the pressure-release effect at the surface. However, bow-riding animals generally dive below the surface intermittently. If they did so while bow-riding near airguns, they would be exposed to strong sound pulses, possibly repeatedly. During this project, the anticipated 180–dB distance is less than 54 m (177 ft), the array is towed 21 m (69 ft) behind the *Melville* and the bow of the Melville will be 106 m (348 ft) ahead of the airguns and the 205–dB zone would be less than 50 m (165 ft). Thus, TTS would not be expected in the case of odontocetes bow riding during airgun operations and if some cetaceans did incur TTS through exposure to airgun sounds, it would very likely be a temporary and reversible phenomenon.

NMFS believes that, to avoid Level A harassment, cetaceans should not be exposed to pulsed underwater noise at received levels exceeding 180 dB re 1 microPa (rms). The corresponding limit for pinnipeds has been set at 190 dB. The predicted 180- and 190–dB distances for the airgun arrays operated by Scripps during this activity are summarized in Table 1 in this document. It has also been shown that most whales tend to avoid ships and associated seismic operations. Thus, whales will likely not be exposed to such high levels of airgun sounds. Because of the slow ship speed, any whales close to the trackline could move away before the sounds become sufficiently strong for there to be any potential for hearing impairment. Therefore, there is little potential for whales being close enough to an array to experience TTS. In addition, as mentioned previously, ramping up the airgun array, which has become standard operational protocol for many seismic operators including Scripps, should allow cetaceans to move away from the seismic source and to avoid being exposed to the full acoustic output of the GI airguns.

Permanent Threshold Shift (PTS)

When PTS occurs there is physical damage to the sound receptors in the ear. In some cases there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges. Although there is no specific evidence that exposure to pulses of airgun sounds can cause PTS in any marine mammals, even with the largest airgun arrays, physical damage to a mammal's hearing apparatus can potentially occur if it is exposed to sound impulses that have very high peak pressures, especially if they have very short rise times (time required for sound pulse to reach peak pressure from the baseline pressure). Such damage can result in a permanent decrease in functional sensitivity of the hearing system at some or all frequencies.

Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage in terrestrial mammals. However, very prolonged exposure to sound strong enough to elicit TTS, or shorter-term exposure to sound levels well above the TTS threshold, can cause PTS, at least in terrestrial mammals (Kryter, 1985). 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. The low-to-moderate levels of TTS that have been induced in captive odontocetes and pinnipeds during recent controlled studies of TTS have been confirmed to be temporary, with no measurable residual PTS (Kastak *et al.*, 1999; Schlundt *et al.*, 2000; Finneran *et al.*, 2002; Nachtigall *et al.*, 2003). In terrestrial mammals, the received sound level from a single non-impulsive sound exposure must be far above the TTS threshold for any risk of permanent hearing damage (Kryter, 1994; Richardson *et al.*, 1995). For impulse sounds with very rapid rise times (e.g., those associated with explosions or gunfire), a received level not greatly in excess of the TTS threshold may start to elicit PTS. Rise times for airgun pulses are rapid, but less rapid than for explosions.

Some factors that contribute to onset of PTS are as follows: (1) exposure to single very intense noises, (2) repetitive exposure to intense sounds that individually cause TTS but not PTS, and (3) recurrent ear infections or (in captive animals) exposure to certain drugs.

Cavanagh (2000) has reviewed the thresholds used to define TTS and PTS. Based on his review and SACLANT (1998), it is reasonable to assume that PTS might occur at a received sound level 20 dB or more above that which induces mild TTS. However, for PTS to occur at a received level only 20 dB above the TTS threshold, it is probable that the animal would have to be exposed to the strong sound for an extended period.

Sound impulse duration, peak amplitude, rise time, and number of pulses are the main factors thought to determine the onset and extent of PTS. Based on existing data, Ketten (1994) has noted that the criteria for differentiating the sound pressure levels that result in PTS (or TTS) are location and species-specific. PTS effects may also be influenced strongly by the health of the receiver's ear.

Given that marine mammals are unlikely to be exposed to received levels of seismic pulses that could cause TTS, it is highly unlikely that they would sustain permanent hearing impairment. If we assume that the TTS threshold for odontocetes for exposure to a series of seismic pulses may be on the order of 220 dB re 1 microPa (pk-pk) (approximately 204 dB re 1 microPa rms), then the PTS threshold might be about 240 dB re 1 microPa (pk-pk). In the units used by geophysicists, this is 10 bar-m. Such levels are found only in the immediate vicinity of the largest airguns (Richardson *et al.*, 1995; Caldwell and Dragoset, 2000). However, it is very unlikely that an odontocete would remain within a few meters of a large airgun for sufficiently long to incur PTS. The TTS (and thus PTS) thresholds of baleen whales and pinnipeds may be lower, and thus may extend to a somewhat greater distance from the source. However, baleen whales generally avoid the immediate area around operating seismic vessels, so it is unlikely that a baleen whale could incur PTS from exposure to airgun pulses. Some pinnipeds do not show strong avoidance of operating airguns. In summary, it is highly unlikely that marine mammals could receive sounds strong enough (and over a sufficient period of time) to cause permanent hearing impairment during this project. In the proposed project marine mammals are unlikely to be exposed to received levels of seismic pulses strong enough to cause TTS, and because of the higher level of sound necessary to cause PTS, it is even less likely that PTS could occur. This is due to the fact that even levels immediately adjacent to the 2 GI-airguns may not be sufficient to induce PTS because the mammal would not be exposed to more than one strong pulse unless it swam alongside an airgun for a period of time.

Strandings 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). Airgun pulses are less energetic and have slower rise times. While there is no documented evidence that airgun arrays can cause serious injury, death, or stranding, the association of strandings of beaked whales with naval exercises and an L-DEO seismic survey in 2002 have raised the possibility that beaked whales may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds. Information on recent beaked whale strandings may be found in Appendix A of the Scripps application and in several previous **Federal Register** documents (see 69 FR 31792 (June 7, 2004) or 69 FR 34996 (June 23, 2004)).

It is important to note that seismic pulses and mid-frequency sonar pulses are quite different. Sounds produced by the types of airgun arrays used to profile sub-sea geological structures are broadband with most of the energy below 1 kHz. Typical military mid-frequency sonars operate at frequencies of 2 to 10 kHz, generally with a relatively narrow bandwidth at any one time (though the center frequency may change over time). Because seismic and sonar sounds have considerably different characteristics and duty cycles, 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 pulses can, in special circumstances, lead to physical damage and, indirectly, mortality suggests that caution is warranted when dealing with exposure of marine mammals to any high-intensity pulsed sound.

In addition to the sonar-related strandings, there was a September, 2002 stranding of two Cuvier's beaked whales in the Gulf of California (Mexico) when a seismic survey by the Ewing was underway in the general area (Malakoff, 2002). The airgun array in use during that project was the *Ewing*'s 20–gun 8490–in^3 array. This might be a first indication that seismic surveys can have effects, at least on beaked whales, similar to the suspected effects of naval sonars. However, the evidence linking the Gulf of California strandings to the seismic surveys is inconclusive, and to date is not based on any physical evidence (Hogarth, 2002; Yoder, 2002). The ship was also operating its multi-beam bathymetric sonar at the same time but this sonar had much less potential than naval sonars to affect beaked whales. Although the link between the Gulf of California strandings and the seismic (plus multi-beam sonar) survey is inconclusive, this plus the various incidents involving beaked whale strandings associated with naval exercises suggests a need for caution when conducting seismic surveys in areas occupied by beaked whales. However, the present project will involve a much smaller sound source than used in typical seismic surveys. Considering this and the required monitoring and mitigation measures, any possibility for strandings and mortality is expected to be eliminated.

Non-auditory Physiological Effects

Possible types of non-auditory physiological effects or injuries that might theoretically occur in marine mammals exposed to strong underwater sound might include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. There is no evidence that any of these effects occur in marine mammals exposed to sound from airgun arrays (even large ones). However, there have been no direct studies of the potential for airgun pulses to elicit any of these effects. If any such effects do occur, they would probably be limited to unusual situations when animals might be exposed at close range for unusually long periods.

It is doubtful that any single marine mammal would be exposed to strong seismic sounds for sufficiently long that significant physiological stress would develop. That is especially so in the case of the present project where the airguns are small, the ship's speed is relatively fast (7 knots or approximately 13 km/h), and for the most part the survey lines are widely spaced with little or no overlap.

Gas-filled structures in marine animals have an inherent fundamental resonance frequency. If stimulated at that frequency, the ensuing resonance could cause damage to the animal. There may also be a possibility that high sound levels could cause bubble formation in the blood of diving mammals that in turn could cause an air embolism, tissue separation, and high, localized pressure in nervous tissue (Gisner (ed), 1999; Houser *et al.*, 2001).

A workshop (Gentry [ed.] 2002) was held to discuss whether the stranding of beaked whales in the Bahamas in 2000 (Balcomb and Claridge, 2001; NOAA and USN, 2001) might have been related to air cavity resonance or bubble formation in tissues caused by exposure to noise from naval sonar. A panel of experts concluded that resonance in air-filled structures was not likely to have caused this stranding. Among other reasons, the air spaces in marine mammals are too large to be susceptible to resonant frequencies emitted by mid- or low-frequency sonar; lung tissue damage has not been observed in any mass, multi-species stranding of beaked whales; and the duration of sonar pings is likely too short to induce vibrations that could damage tissues (Gentry (ed.), 2002). Opinions were less conclusive about the possible role of gas (nitrogen) bubble formation/growth in the Bahamas stranding of beaked whales.

Until recently, it was assumed that diving marine mammals are not subject to the bends or air embolism. However, a short paper concerning beaked whales stranded in the Canary Islands in 2002 suggests that cetaceans might be subject to decompression injury in some situations (Jepson *et al.*, 2003). If so, that might occur if they ascend unusually quickly when exposed to aversive sounds. However, the interpretation that the effect was related to decompression injury is unproven (Piantadosi and Thalmann, 2004; Fernandez *et al.*, 2004). Even if that effect can occur during exposure to mid-frequency sonar, there is no evidence that this type of effect occurs in response to low-frequency airgun sounds. It is especially unlikely in the case of this project involving only two small GI-airguns.

In summary, little is known about the potential for seismic survey sounds to cause either auditory impairment or other non-auditory physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would be limited to short distances from the sound source. However, the available data do not allow for meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in these ways. Marine mammals that show behavioral avoidance of seismic vessels, including most baleen whales, some odontocetes, and some pinnipeds, are unlikely to incur auditory impairment or other physical effects. Also, the planned mitigation and monitoring measures are expected to minimize any possibility of serious injury, mortality or strandings.

Possible Effects of Mid-frequency Sonar Signals

A multi-beam bathymetric sonar (Sea Beam 2000, 12 kHz) and a sub-bottom profiler will be operated from the source vessel essentially continuously during the planned survey. Details about these sonars were provided previously in this document.

Navy sonars that have been linked to avoidance reactions and stranding of cetaceans generally (1) are more powerful than the Sea Beam 2000 sonar, (2) have a longer pulse duration, and (3) are directed close to horizontally (vs. downward for the Sea Beam 2000). The area of possible influence of the Sea Beam 2000 is much smaller-a narrow band oriented in the cross-track direction below the source vessel. Marine mammals that encounter the Sea Beam 2000 at close range 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 and vessel speed. Therefore, as harassment or injury from pulsed sound is a function of total energy received, the actual harassment or injury threshold for the bathymetric sonar signals (approximately 10 ms) would be at a much higher dB level than that for longer duration pulses such as seismic signals. As a result, NMFS believes that marine mammals are unlikely to be harassed or injured from the multi-beam sonar.

Masking by Mid-frequency Sonar Signals

Marine mammal communications will not be masked appreciably by the multi-beam sonar signals or the sub-bottom profiler given the low duty cycle and directionality of the sonars and the brief period when an individual mammal is likely to be within its beam. Furthermore, in the case of baleen whales, the sonar signals from the Sea Beam 2000 sonar do not overlap with the predominant frequencies of the calls, which would avoid significant masking.

For the sub-bottom profiler, marine mammal communications will not be masked appreciably because of their relatively low power output, low duty cycle, directionality (for the profiler), and the brief period when an individual mammal may be within the sonar's beam. In the case of most odonotocetes, the sonar signals from the profiler do not overlap with the predominant frequencies in their calls. In the case of mysticetes, the pulses from the pinger do not overlap with their predominant frequencies.

Behavioral Responses Resulting from Mid-frequency Sonar Signals

Behavioral reactions of free-ranging marine mammals to military and other sonars 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 (Rendell and Gordon, 1999), and the previously-mentioned strandings by beaked whales. Also, Navy personnel have described observations of dolphins bow-riding adjacent to bow-mounted mid-frequency sonars during sonar transmissions. However, all of these observations are of limited relevance to the present situation. Pulse durations from these sonars were much longer than those of the Scripps multi-beam sonar, and a given mammal would have received many pulses from the naval sonars. During Scripps' 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.

Captive bottlenose dolphins and a white whale exhibited changes in behavior when exposed to 1–sec pulsed sounds at frequencies similar to those that will be emitted by the multi-beam sonar used by Scripps 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). The relevance of these data to free-ranging odontocetes is uncertain and in any case the test sounds were quite different in either duration or bandwidth as compared to those from a bathymetric sonar.

Scripps and NMFS are not aware of any data on the reactions of pinnipeds to sonar sounds at frequencies similar to those of the 12.0 kHz frequency of the *Melville*'s multi-beam sonar. Based on observed pinniped responses to other types of pulsed sounds, and the likely brevity of exposure to the bathymetric sonar sounds, pinniped reactions are expected to be limited to startle or otherwise brief responses of no lasting consequences to the individual animals. The pulsed signals from the sub-bottom profiler are much weaker than those from the multi-beam sonar and somewhat weaker than those from the 2 GI-airgun array. Therefore, significant behavioral responses are not expected.

Hearing Impairment and Other Physical Effects

Given recent stranding events that have been associated with the operation of naval sonar, there is much concern that sonar noise can cause serious impacts to marine mammals (for discussion see Effects of Seismic Surveys on Marine Mammals). However, the multi-beam sonars proposed for use by Scripps are quite different than sonars used for navy operations. Pulse duration of the bathymetric sonars is very short relative to the naval sonars. Also, at any given location, an individual marine mammal would be in the beam of the multi-beam sonar for much less time given the generally downward orientation of the beam and its narrow fore-aft beam-width. (Navy sonars often use near-horizontally-directed sound.) These factors would all reduce the sound energy received from the multi-beam sonar rather drastically relative to that from the sonars used by the Navy. Therefore, hearing impairment by multi-beam bathymetric sonar is unlikely.

Source levels of the sub-bottom profiler are much lower than those of the airguns and the multi-beam sonar. Sound levels from a sub-bottom profiler similar to the one on the Melville were estimated to decrease to 180 dB re 1 microPa (rms) at 8 m (26 ft) horizontally from the source (Burgess and Lawson, 2000), and at approximately 18 m downward from the source. Furthermore, received levels of pulsed sounds that are necessary to cause temporary or especially permanent hearing impairment in marine mammals appear to be higher than 180 dB (see earlier discussion). Thus, it is unlikely that the sub-bottom profiler 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 sub-bottom profiler is usually operated simultaneously with other higher-power acoustic sources. Many marine mammals will move away in response to the approaching higher-power sources or the vessel itself before the mammals would be close enough for there to be any possibility of effects from the less intense sounds from the sub-bottom profiler. In the case of mammals that do not avoid the approaching vessel and its various sound sources, mitigation measures that would be applied to minimize effects of the higher-power sources would further reduce or eliminate any minor effects of the sub-bottom profiler.

Estimates of Take by Harassment for the SWPO Seismic Survey

Given the proposed mitigation (see Mitigation later in this document), all anticipated takes involve a temporary change in behavior that may constitute Level B harassment. The proposed mitigation measures will minimize or eliminate the possibility of Level A harassment or mortality. Scripps has calculated the ''best estimates'' for the numbers of animals that could be taken by level B harassment during the proposed SWPO seismic survey using data on marine mammal density (numbers per unit area) and estimates of the size of the affected area, as shown in the predicted RMS radii table (see Table 1). Because there is very little information on marine mammal densities in the proposed survey area, densities were used from two of Longhurst's (1998) biogeographic provinces north of the survey area that are oceanographically similar to the two provinces in which most of the seismic activities will take place.

These estimates are based on a consideration of the number of marine mammals that might be exposed to sound levels greater than 160 dB, the criterion for the onset of Level B harassment, by operations with the 2 GI-gun array planned to be used for this project. The anticipated zone of influence of the multi-beam sonar and sub-bottom profiler are less than that for the airguns, so it is assumed that during simultaneous operations of these instruments that any marine mammals close enough to be affected by the multi-beam and sub-bottom profiler sonars would already be affected by the airguns. Therefore, no additional incidental takings are included for animals that might be affected by the multi-beam sonar. Given their characteristics (described previously), no Level B harassment takings are considered likely when the multi-beam and sub-bottom profiler are operating but the airguns are silent.

Table 2 provides the best estimate of the numbers of each species that would be exposed to seismic sounds greater than 160 dB. A detailed description on the methodology used by Scripps to arrive at the estimates of Level B harassment takes that are provided in Table 2 can be found in Scripps's IHA application for the SWPO survey.

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TABLE 2. Estimates of the possible numbers of marine mammal exposures to the different sound levels, and the numbers of different individuals that might be exposed, during the proposed seismic surveys in the SW Pacific Ocean during February-March 2005.

Odontocetes					
Physeteridae					
Sperm whale	9	19	9	0.0	19
Pygmy sperm whale	8	35	8	NA	35
Dwarf sperm whale	6	66	6	0.0	66
Ziphiidae					
Southern bottlenose whale	17	93	17	0.0	93
Arnoux's beaked whale	3	14	2	NA	14
Cuvier's beaked whale	4	23	4	0.0	23
Shepard's beaked whale	2	9	2	NA	
Andrew's beaked whale	2	9	2	NA	
Blaineville's beaked whale	4	23	4	NA	
Ginkgo-toothed beaked whale	1	5	1	NA	
Gray's beaked whale	4	23	4	NA	
Hector's beaked whale	1	5	1	NA	5
Spade-toothed beaked whale	1	5	1	NA	5
Strap-toothed beaked whale	3	19	3	NA	19
Delphinidae					
Rough-toothed dolphin	247	440	243	0.1	440
Bottlenose dolphin	247	440	243	0.1	440
Pantropical spotted dolphin	1235	2202	1215	0.1	2202
Spinner dolphin	618	1101	608	0.1	1101
Striped dolphin	124	220	122	0.0	220
Common dolphin	124	220	122	0.0	220
Hourglass dolphin	618	1101	608	0.2	1101
Fraser's dolphin	124	220	122	0.0	220
Southern right-whale dolphin	371	660	365	NA	660
Risso's dolphin	371	660	365	0.2	660
Melon-headed whale	4	19	4	0.0	19
Pygmy killer whale	7	39	7	0.0	39
False killer whale	11	58	11	0.0	58
Killer whale	18	97	18	0.1	97
Short-finned pilot whale	18	97	18	0.0	97
Long-finned pilot whale	29	155	28	0.0	155
Phocoenidae					
Spectacled porpoise	114	1181	112	NA	1181
Mysticetes					
Southern right whale	2	5	2	NA	5
Pygmy right whale	2	3	2	NA	3
Humpback whale	2	3	2	0.0	3
Minke whale	32	61	31	0.0	61
Dwarf minke whale	3	6	3	NA	6
Bryde's whale	4	8	4	0.0	8
Sei whale	4	8	4	0.0	8
Fin whale	2	5	2	0.0	5
Blue whale	2	3	2	0.1	3
Pinnipeds					
Southern elephant seal	23	NA	22	0.0	23
Leopard seal	46	NA	45	0.1	46
Crabeater seal	23	NA	22	0.0	23
Antarctic fur seal	46	NA	45	0.0	46
Sub-antarctic fur seal	46	NA	45 (45)	NA	46

[a] Best estimate and maximum estimates of density are from Table 3, in Scripps, 2004.

[b] Regional population size estimates are from Table 2, in Scripps, 2004.

[c] NA indicates that regional population estimates are not available.

0.95

Delphinids 4162

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Conclusions

Effects on Cetaceans

Strong avoidance reactions by several species of mysticetes to seismic vessels have been observed at ranges up to 6–8 km (3.2–4.3 nm) and occasionally as far as 20–30 km (10.8–16.2 nm) from the source vessel when large arrays have been used. However, reactions at the longer distances appear to be atypical of most species and situations, and to large arrays. Furthermore, if they are encountered, the numbers of mysticetes estimated to occur within the 160–dB isopleth in the survey area are expected to be low. In addition, the estimated numbers presented in Table 2 are considered overestimates of actual numbers for three primary reasons. First, because the survey is scheduled for the end of the austral summer, some of the mysticetes and some species of odontocetes are expected to be present in feeding areas south of the survey area. Second, the estimated 160–dB radii used here are probably overestimates of the actual 160–dB radii at deep-water sites (Tolstoy et al. 2004) such as the SWPO survey area. Third, Scripps plans to use smaller GI guns than those on which the radii are based.

Odontocete reactions to seismic pulses, or at least the reactions of dolphins, are expected to extend to lesser distances than are those of mysticetes. Odontocete low-frequency hearing is less sensitive than that of mysticetes, and dolphins are often seen from seismic vessels. In fact, there are documented instances of dolphins approaching active seismic vessels. However, dolphins as well as some other types of odontocetes sometimes show avoidance responses and/or other changes in behavior when near operating seismic vessels.

Taking into account the small size and the relatively low sound output of the 2 GI-airguns to be used, and the mitigation measures that are planned, effects on cetaceans are generally expected to be limited to avoidance of a very small area around the seismic operation and short-term changes in behavior, falling within the MMPA definition of Level B harassment. Furthermore, the estimated numbers of animals potentially exposed to sound levels sufficient to cause appreciable disturbance are very low percentages of the affected populations.

Based on the 160–dB criterion, the best estimates of the numbers of individual cetaceans that may be exposed to sounds ≥160 dB re 1 microPa (rms) represent 0 to approximately 0.2 percent of the populations of each species that may be encountered in the survey area. The assumed population sizes used to calculate the percentages are presented in Table 2 of the Scripps application. For species listed as endangered under the ESA, the estimates are significantly less than 0.1 percent of the SWPO population of sperm, humpback, sei, and fin whales; probably less than 0.1 percent of southern right whales; and 0.1 percent of blue whales (Table 2). In the cases of mysticetes, beaked whales, and sperm whales, the potential reactions are expected to involve no more than small numbers (2–32) of individual cetaceans. The sperm whale is the endangered species that is most likely to be exposed, and their SWPO population is approximately 140,000 (data of Butterworth et al. 1994 with g(0) correction from Barlow (1999) applied).

Larger numbers of delphinids may be affected by the proposed seismic study, but the population sizes of species likely to occur in the operating area are large, and the numbers potentially affected are small relative to the population sizes (see Table 2). The best estimate of number of individual delphinids that might be exposed to sounds 160 dB re 1 microPa (rms) represents significantly less than 0.01 percent of the approximately 8,200,000 dolphins estimated to occur in the SWPO, and 0–0.2 percent of the populations of each species occurring there (Table 2).

Mitigation measures such as controlled speed, course alteration, observers, ramp ups, and power downs or shut downs when marine mammals are seen within defined ranges should further reduce short-term reactions, and minimize any effects on hearing. In all cases, the effects are expected to be short-term, with no lasting biological consequence. In light of the type of take expected and the small percentages of affected stocks of cetaceans, the action is expected to have no more than a negligible impact on the affected species or stocks of cetaceans.

Effects on Pinnipeds

Five pinniped species-the sub-Antarctic fur seal, Antarctic fur seal, crabeater seal, leopard seal, and southern elephant seal-may be encountered at the survey sites, but their distribution and numbers have not been documented in the proposed survey area. An estimated 22–45 individuals of each species of seal may be exposed to airgun sounds with received levels > 160 dB re 1 microPa (rms). The estimates of pinnipeds that may be exposed to received levels > 160 dB are probably overestimates of the actual numbers that will be affected significantly. The proposed survey would have, at most, a short-term effect on their behavior and no long-term impacts on individual pinnipeds or their populations. Responses of pinnipeds to acoustic disturbance are variable, but usually quite limited. Effects are expected to be limited to short-term and localized behavioral changes falling within the MMPA definition of Level B harassment. As is the case for cetaceans, the short-term exposures to sounds from the two GI-guns are not expected to result in any long-term consequences for the individuals or their populations and the activity is expected to have no more than a negligible impact on the affected species or stocks of pinnipeds.

Potential Effects on Habitat

The proposed seismic survey will not result in any permanent impact on habitats used by marine mammals, or to the food sources they utilize. The main impact issue associated with the proposed activity will be temporarily elevated noise levels and the associated direct effects on marine mammals.

One of the reasons for the adoption of airguns as the standard energy source for marine seismic surveys was that they (unlike the explosives used in the distant past) do not result in any appreciable fish kill. Various experimental studies showed that airgun discharges cause little or no fish kill, and that any injurious effects were generally limited to the water within a meter or so of an airgun. However, it has recently been found that injurious effects on captive fish, especially on fish hearing, may occur at somewhat greater distances than previously thought (McCauley *et al.*, 2000a,b, 2002; 2003). Even so, any injurious effects on fish would be limited to short distances from the source. Also, many of the fish that might otherwise be within the injury-zone are likely to be displaced from this region prior to the approach of the airguns through avoidance reactions to the passing seismic vessel or to the airgun sounds as received at distances beyond the injury radius.

Fish often react to sounds, especially strong and/or intermittent sounds of low frequency. Sound pulses at received levels of 160 dB re 1 μPa (peak) may cause subtle changes in behavior. Pulses at levels of 180 dB (peak) may cause noticeable changes in behavior (Chapman and Hawkins, 1969; Pearson *et al.*, 1992; Skalski *et al.*, 1992). It also appears that fish often habituate to repeated strong sounds rather rapidly, on time scales of minutes to an hour. However, the habituation does not endure, and resumption of the disturbing activity may again elicit disturbance responses from the same fish.

Fish near the airguns are likely to dive or exhibit some other kind of behavioral response. This might have short-term impacts on the ability of cetaceans to feed near the survey area. However, only a small fraction of the available habitat would be ensonified at any given time, and fish species would return to their pre-disturbance behavior once the seismic activity ceased. Thus, the proposed surveys would have little impact on the abilities of marine mammals to feed in the area where seismic work is planned. Some of the fish that do not avoid the approaching airguns (probably a small number) may be subject to auditory or other injuries.

Zooplankton that are very close to the source may react to the airgun's shock wave. These animals have an exoskeleton and no air sacs; therefore, little or no mortality is expected. Many crustaceans can make sounds and some crustacea and other invertebrates have some type of sound receptor. However, the reactions of zooplankton to sound are not known. Some mysticetes feed on concentrations of zooplankton. A reaction by zooplankton to a seismic impulse would only be relevant to whales if it caused a concentration of zooplankton to scatter. Pressure changes of sufficient magnitude to cause this type of reaction would probably occur only very close to the source, so few zooplankton concentrations would be affected. Impacts on zooplankton behavior are predicted to be negligible, and this would translate into negligible impacts on feeding mysticetes.

Potential Effects on Subsistence Use of Marine Mammals

There is no known legal subsistence hunting for marine mammals in the SWPO, so the proposed Scripps activities will not have any impact on the availability of these species or stocks for subsistence users.

Mitigation

For the proposed seismic survey in the SWPO during February-March 2005, Scripps will deploy 2–GI airguns as an energy source, with a total discharge volume of 90 in^3. The energy from the airguns will be directed mostly downward. The directional nature of the airguns to be used in this project is an important mitigating factor. This directionality will result in reduced sound levels at any given horizontal distance as compared with the levels expected at that distance if the source were omnidirectional with the stated nominal source level. Also, the small size of these airguns is an inherent and important mitigation measure that will reduce the potential for effects relative to those that might occur with large airgun arrays. This measure is in conformance with NMFS encouraging seismic operators to use the lowest intensity airguns practical to accomplish research objectives.

The following mitigation measures, as well as marine mammal visual monitoring (discussed later in this document), will be implemented for the subject seismic surveys: (1) Speed and course alteration (provided that they do not compromise operational safety requirements); (2) shut-down procedures; and (3) ramp-up procedures. Because the safety radius for cetaceans is only 54 m (177 ft) the use of passive acoustics to detect vocalizing marine mammals is not warranted for this survey. Similarly, and because the *Melville* will be transiting a distance of approximately 11,000 km (5940 nm) during the survey period at a speed of approximately 7 knots, aerial and secondary vessel support is not warranted.

Speed and Course Alteration

If a marine mammal is detected outside its respective safety zone (180 dB for cetaceans, 190 dB for pinnipeds) and, based on its position and the relative motion, is likely to enter the safety zone, the vessel's speed and/or direct course may, when practical and safe, be changed in a manner that also minimizes the effect to the planned science objectives. The marine mammal activities and movements relative to the seismic vessel will be closely monitored to ensure that the marine mammal does not approach within the safety zone. If the mammal appears likely to enter the safety zone, further mitigative actions will be taken (i.e., either further course alterations or shut-down of the airguns).

Shut-down Procedures

If a marine mammal is detected outside the safety radius but is likely to enter the safety radius, and if the vessel's course and/or speed cannot be changed to avoid having the animal enter the safety radius, the airguns will be shut down before the animal is within the safety radius. Likewise, if a marine mammal is already within the safety radius when first detected, the airguns will be shut down immediately.

Following a shut-down, airgun activity will not resume until the marine mammal has cleared the safety zone. The animal will be considered to have cleared the safety zone if it (1) is visually observed to have left the safety zone, or (2) has not been seen within the zone for 15 min in the case of small odontocetes and pinnipeds, or (3) has not been seen within the zone for 30 min in the case of mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, bottlenose and beaked whales.

Ramp-up Procedure

A ''ramp-up'' procedure will be followed when the airguns begin operating after a period without airgun operations. The 2–GI guns will be added in sequence 5 minutes apart. During ramp-up procedures, the safety radius for the 2–GI guns will be maintained.

During the day or night, ramp-up cannot begin from a shut-down unless the entire 180–dB safety radius has been visible for at least 30 minutes prior to the ramp up (i.e., no ramp-up can begin in heavy fog or high sea states). During nighttime operations, if the entire safety radius is visible using either vessel lights or night-vision devices (NVDs), then start up of the airguns from a shut down may occur. Considering that the safety zone will be an area approximately from mid-ship sternward to the area of the hydrophone streamer and extending only about 46 m (ft) beyond the vessel, NMFS believes that either deck lighting or NVDs will be capable of locating any marine mammal that might enter the safety zone at night.

Comments on past IHAs raised the issue of prohibiting nighttime operations as a practical mitigation measure. However, this is not practicable due to cost considerations and ship time schedules. The daily cost to the federal government to operate vessels such as *Melville* is approximately $33,000-$35,000 /day (Ljunngren, pers. comm. May 28, 2003). If the vessels were prohibited from operating during nighttime, each trip could require an additional three to five days to complete, or up to $175,000 more, depending on average daylight at the time of work.

If a seismic survey vessel is limited to daylight seismic operations, efficiency would also be much reduced. Without commenting specifically on how that would affect the present project, for seismic operators in general, a daylight-only requirement would be expected to result in one or more of the following outcomes: cancellation of potentially valuable seismic surveys; reduction in the total number of seismic cruises annually due to longer cruise durations; a need for additional vessels to conduct the seismic operations; or work conducted by non-U.S. operators or non-U.S. vessels when in waters not subject to U.S. law.

Marine Mammal Monitoring

Scripps must have at least two visual observers on board the Melville, and at least one must be an experienced marine mammalsw observer that NMFS has approved in advance of the start of the PO cruise. These observers will be on duty in shifts of no longer than 4 hours.

The visual observers will monitor marine mammals and sea turtles near the seismic source vessel during all daytime airgun operations, during any nighttime start-ups of the airguns and at night. During daylight, vessel-based observers will watch for marine mammals and sea turtles near the seismic vessel during periods with shooting (including ramp-ups), and for 30 minutes prior to the planned start of airgun operations after a shut-down. NMFS has determined that a monitoring requirement for observers to be on watch at night whenever daytime monitoring resulted in one or more shut-down situations due to marine mammal presence is not warranted for this operation since the *Melville* will be transiting the area and not remaining in the area where this requirement would provide protection for marine mammals. With a ship speed of 7 knots, the *Melville* may be a number of miles from the marine mammal siting/shut-down area by night-time.

Use of multiple observers will increase the likelihood that marine mammals near the source vessel are detected. Scripps bridge personnel will also assist in detecting marine mammals and implementing mitigation requirements whenever possible (they will be given instruction on how to do so), especially during ongoing operations at night when the designated observers are on stand-by and not required to be on watch at all times. The observer(s) and bridge watch will watch for marine mammals from the highest practical vantage point on the vessel or from the stern of the vessel, whichever provides the greatest total visibility of the safety zone.

In addition, biological observers are required to record biological information on marine mammals sighted outside the safety zone, but within the 160–dB isopleth. For this activity, the observer(s) will systematically scan the area around the vessel with Big Eyes binoculars, reticle binoculars (e.g., 7 X 50 Fujinon) and with the naked eye during the daytime. Laser range-finding binoculars (Leica L.F. 1200 laser rangefinder or equivalent) will be available to assist with distance estimation. The observers will be used to determine when a marine mammal or sea turtle is in or near the safety radii so that the required mitigation measures, such as course alteration and power-down or shut-down, can be implemented. If the GI-airguns are shut down, observers will maintain watch to determine when the animal is outside the safety radius.

Observers are not required to be on duty during ongoing seismic operations at night (although they may do so); bridge personnel will watch for marine mammals during this time and will call for the airguns to be shut-down if marine mammals are observed in or about to enter the safety radii. However, a biological observer must be on standby at night and available to assist the bridge watch if marine mammals are detected. If the airguns are ramped-up at night (see previous section), two marine mammal observers will monitor for marine mammals for 30 minutes prior to ramp-up and during the ramp-up using either deck lighting or NVDs that will be available (ITT F500 Series Generation 3 binocular image intensifier or equivalent).

Taking into consideration the additional costs of prohibiting nighttime operations and the likely impact of the activity (including all mitigation and monitoring), NMFS has determined that the proposed mitigation and monitoring ensures that the activity will have the least practicable impact on the affected species or stocks. Marine mammals will have sufficient notice of a vessel approaching with operating seismic airguns, thereby giving them an opportunity to avoid the approaching array; if ramp-up is required, two marine mammal observers will be required to monitor the safety radii using shipboard lighting or NVDs for at least 30 minutes before ramp-up begins and verify that no marine mammals are in or approaching the safety radii; ramp-up may not begin unless the entire safety radii are visible.

Reporting

Scripps will submit a report to NMFS within 90 days after the end of the cruise, which is currently predicted to occur during February and March, 2004. The report will describe the operations that were conducted and the marine mammals that were detected. The report must provide full documentation of methods, results, and interpretation pertaining to all monitoring tasks. The report will summarize the dates and locations of seismic operations, marine mammal sightings (dates, times, locations, activities, associated seismic survey activities), and estimates of the amount and nature of potential take of marine mammals by harassment or in other ways.

Endangered Species Act (ESA)

NMFS has issued a biological opinion regarding the effects of this action on ESA-listed species and critical habitat under the jurisdiction of NMFS. That biological opinion concluded that this action is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. A copy of the Biological Opinion is available upon request (see **ADDRESSES**).

National Environmental Policy Act (NEPA)

The NSF made a FONSI determination on September 30, 2004, based on information contained within its EA, that implementation of the subject action is not a major Federal action having significant effects on the environment within the meaning of NEPA. NSF determined, therefore, that an environmental impact statement would not be prepared. On December 3, 2004 (69 FR 70236), NMFS noted that the NSF had prepared an EA for the SWPO surveys and made this EA available upon request. In accordance with NOAA Administrative Order 216–6 (Environmental Review Procedures for Implementing the National Environmental Policy Act, May 20, 1999), NMFS has reviewed the information contained in NSF's EA and determined that the NSF EA accurately and completely describes the proposed action alternative, and the potential impacts on marine mammals, endangered species, and other marine life that could be impacted by the preferred alternative and the other alternatives. Accordingly, NMFS adopted the NSF EA under 40 CFR 1506.3 and made its own FONSI. The NMFS FONSI also takes into consideration additional mitigation measures required by the IHA that are not in NSF's EA. Therefore, it is not necessary to issue a new EA, supplemental EA or an environmental impact statement for the issuance of an IHA to L-DEO for this activity. A copy of the EA and the NMFS FONSI for this activity is available upon request (see **ADDRESSES**).

Determinations

NMFS has determined that the impact of conducting the seismic survey in the SWPO off may result, at worst, in a temporary modification in behavior by certain species of marine mammals. This activity is expected to result in no more than a negligible impact on the affected species or stocks.

For reasons stated previously in this document, this determination is supported by (1) the likelihood that, given sufficient notice through slow ship speed and ramp-up, marine mammals are expected to move away from a noise source that it is annoying prior to its becoming potentially injurious; (2) recent research that indicates that TTS is unlikely (at least in delphinids) until levels closer to 200–205 dB re 1 microPa are reached rather than 180 dB re 1 microPa; (3) the fact that 200–205 dB isopleths would be well within a few dozen meters of the vessel because of the small acoustic source; and (4) the likelihood that marine mammal detection ability by trained observers is close to 100 percent during daytime and remains high at night to the distance from the seismic vessel to the 180–dB isopleth. As a result, no take by injury or death is anticipated, and the potential for temporary or permanent hearing impairment is very low and will be avoided through the incorporation of the proposed mitigation measures mentioned in this document.

While the number of potential incidental harassment takes will depend on the distribution and abundance of marine mammals in the vicinity of the survey activity, the number of potential harassment takings is estimated to be small. In addition, the proposed seismic program will not interfere with any legal subsistence hunts, since seismic operations will not take place in subsistence whaling and sealing areas and will not affect marine mammals used for subsistence purposes.

Authorization

NMFS has issued an IHA to L-DEO to take marine mammals, by harassment, incidental to conducting seismic surveys in the SWPO for a 1–year period, provided the mitigation, monitoring, and reporting requirements are undertaken.

Dated: February 10, 2005.

Laurie K. Allen,

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

[FR Doc. 05–3442 Filed 2–22–05; 8:45 am]

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COMMITTEE FOR THE IMPLEMENTATION OF TEXTILE AGREEMENTS

Announcement of Import Restraint Limits for Certain Wool Textile Products Produced or Manufactured in Ukraine and Reinstating Textile Visa Requirements

February 17, 2005.

AGENCY: Committee for the Implementation of Textile Agreements (CITA).

ACTION: Issuing a directive to the Commissioner, Bureau of Customs and Border Protection establishing limits and reinstating textile visa requirements.

EFFECTIVE DATE: January 1, 2005.

FOR FURTHER INFORMATION CONTACT: Naomi Freeman, International Trade Specialist, Office of Textiles and Apparel, U.S. Department of Commerce, (202) 482–4212. For information on the quota status of these limits, refer to the Bureau of Customs and Border Protection website (http://www.cbp.gov), or call (202) 344-2650. For information on embargoes and quota re-openings, refer to the Office of Textiles and Apparel website at http://otexa.ita.doc.gov.

SUPPLEMENTARY INFORMATION:

Authority: Section 204 of the Agricultural Act of 1956, as amended (7 U.S.C. 1854); Executive Order 11651 of March 3, 1972, as amended.

The Bilateral Textile Agreement of July 22, 1998, as amended and extended by exchange of notes on November 19, 2004, December 31, 2004, and February 7, 2005, between the Governments of the United States and Ukraine establishes limits for certain wool textile products, produced or manufactured in Ukraine and exported during the period beginning on January 1, 2005 and extending through December 31, 2005. Goods exported from Ukraine will also no longer be subject to the notice and letter concerning overshipments of 2004 limits (see 69 FR 72181, published on December 13, 2004).

In the letter published below, the Chairman of CITA directs the Commissioner, Bureau of Customs and Border Protection to establish the 2005 limits. The letter also directs the Commissioner to reinstate textile visa requirements for Ukraine; those requirements were suspended in a notice and letter to the Commissioner dated December 30, 2004 (see 70 FR 793, published on January 5, 2005). These requirements are set forth in the notice and letter to the Commissioner of Customs dated February 22, 1999 (see 64 FR 9477). In order to provide a period for adjustment, the United States will allow shipments of goods that are not accompanied by an export visa to enter the United States if exported prior to March 25, 2005. However, shipments exported from Ukraine on or after March 25, 2005, must be accompanied by an export visa issued by the Government of Ukraine, and shipments without an export visa will be denied entry.

These limits may be revised if Ukraine becomes a member of the World Trade Organization (WTO) and the United States applies the WTO agreement to Ukraine.

A description of the textile and apparel categories in terms of HTS numbers is available in the CORRELATION: Textile and Apparel Categories with the Harmonized Tariff Schedule of the United States (see **Federal Register** notice 69 FR 4926, published on February 2, 2004). Information regarding the availability of the 2005 CORRELATION will be published in the **Federal Register** at a later date.

James C. Leonard III,

Chairman, Committee for the Implementation of Textile Agreements.

Committee for the Implementation of Textile Agreements

February 17, 2005.

Commissioner,
Bureau of Customs and Border Protection, Washington, DC 20229.

Dear Commissioner: Pursuant to section 204 of the Agricultural Act of 1956, as amended (7 U.S.C. 1854); Executive Order 11651 of March 3, 1972, as amended; and the Bilateral Textile Agreement of July 22, 1998, as amended and extended by exchange of notes on November 19, 2004, December 31, 2004, and February 7, 2005, between the Governments of the United States and Ukraine, you are directed to prohibit, effective on January 1, 2005, entry into the United States for consumption and withdrawal from warehouse for consumption of wool textile products in the following categories, produced or manufactured in Ukraine and exported during the twelve-month period beginning on January 1, 2005 and extending through December 31, 2005, in excess of the following levels of restraint:

Category	Twelve-month limit
435	108,000 dozen.
442	17,230 dozen.
444	74,665 numbers.
448	74,665 dozen.

The limits set forth above are subject to adjustment pursuant to the current bilateral agreement between the Governments of the United States and Ukraine.

These limits may be revised if Ukraine becomes a member of the World Trade