



MARINE MAMMAL COMMISSION

1 April 2015

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application submitted by the Scripps Institution of Oceanography (Scripps), on behalf of Scripps and the National Science Foundation (NSF), seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act (the MMPA) to take small numbers of marine mammals by harassment. The taking would be incidental to a marine geophysical survey to be conducted off New Zealand in May and June 2015. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 20 March 2015 notice announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (80 Fed. Reg. 15060).

Some issues raised in previous Commission letters regarding similar geophysical surveys reflect ongoing concerns that apply more broadly to incidental take authorization applications, not just those from Scripps. The Commission has recommended numerous times that NMFS adjust density estimates used to estimate the numbers of potential takes by incorporating some measure of uncertainty when available density data originate from other geographical areas and temporal scales¹. In this instance, Scripps used various extrapolations² and adjustments based on numerous assumptions in the absence of applicable density data off New Zealand. It would have been very useful if NMFS had a policy or other guidance available to inform the proposed authorization that would set forth a consistent approach for how applicants should incorporate uncertainty in density estimates. In addition, the Commission previously has recommended that NMFS follow a consistent approach in assessing the potential for taking by Level B harassment from exposure to specific types of sound sources (e.g., echosounders, sub-bottom profilers, side-scan sonar, and fish-finding sonar) by all applicants who propose to use them³. Scripps would be using such sources during its activities off New Zealand, including when the airgun array would not be in use. The Commission understands that NMFS plans to develop clearer policies and guidance to address these concerns.

¹ Including the age of the data.

² Including data from the California Current, Eastern Tropical Pacific Ocean, and the Southern Ocean.

³ Please refer to the Commission's 23 February 2015 and 30 January 2014 letters detailing its rationale.

The Commission would welcome the opportunity to work with NMFS as it develops these broadly applicable policies.

Background

Scripps has proposed to conduct a low-energy geophysical survey in the exclusive economic zone of New Zealand. The purpose of the proposed survey is to investigate the thermal structure of the Hikurangi subduction zone and gas hydrate-related bottom simulation reflections. The survey would be conducted in waters estimated to be 200–3,000 m in depth with approximately 1,250 km of tracklines. The R/V *Roger Revelle* would tow a two-airgun array (nominal source level of 230.6 dB re 1 μ Pa at 1 m (peak) with a maximum discharge volume of 90 in³) at 2 m depth. The *Revelle* also would tow one 600-m hydrophone streamer during the survey; ocean bottom seismometers that were deployed previously would be used during the seismic portion of the survey as well. Scripps would conduct heat-flow measurements during the survey and operate a 3.5-kHz subbottom profiler, 12-kHz multibeam echosounder, and various acoustic pingers to locate instruments throughout the survey.

NMFS preliminarily has determined that, at most, the proposed activities would result in a temporary modification in the behavior of small numbers of up to 32 species of marine mammals and that any impact on the affected species would be negligible. NMFS does not anticipate any take of marine mammals by death or serious injury. It also believes that the potential for temporary or permanent hearing impairment will be at the least practicable level because of the proposed mitigation measures. Those measures include (1) monitoring exclusion and buffer zones, (2) using shut-down and ramp-up procedures, and (3) speed and course alterations, if safe and practicable.

Despite repeated recommendations in previous letters and discussions regarding the Commission's concerns with NMFS, NSF, Lamont-Doherty Earth Observatory (LDEO), and U.S. Geological Survey (USGS), some major issues remain unresolved. These ongoing concerns are summarized in the following sections.

Uncertainty in modeling exclusion and buffer zones

The Commission has identified issues with the method used to estimate exclusion and buffer zones (based on Level A and B harassment, respectively) and the numbers of takes incidental to NSF-funded geophysical research beginning in 2010. Briefly, LDEO performs acoustic modeling for geophysical research funded by NSF. For at least 6 years, LDEO has estimated exclusion and buffer zones using a simple ray trace–based modeling approach that assumes spherical spreading, a constant sound speed, and no bottom interactions (Diebold et al. 2010). As noted in the Commission's previous letters (see the Commission's enclosed 8 December 2014 letter for detailed rationale regarding its comments on LDEO's model), numerous studies⁴ have underscored the importance of incorporating site-specific environmental and operational parameters into estimating exclusion and buffer zones. The recent Crone et al. (2014)⁵ study indicated that, in shallow and sloped environments, the complexity of local geology and bathymetry and the typical lack of

⁴ Tolstoy et al. (2004), Tolstoy et al. (2009), Diebold et al. (2010), and most recently, Crone et al. (2014).

⁵ Crone et al. (2014) used hydrophone data from waters off Washington State to compare empirically derived estimates to model-estimated exclusion and buffer zones for LDEO's 36-airgun array.

sufficient information regarding this complexity can make it difficult to predict sound levels accurately as a function of distance from the source array. In contrast to the most widely accepted current approaches in the scientific literature, LDEO's model does not incorporate environmental characteristics of the specific study area, including sound speed profiles and refraction within the water column, bathymetry/water depth, sediment properties/bottom loss, or absorption coefficients.

To estimate the proposed exclusion and buffer zones for the survey off New Zealand, LDEO used two G airguns as a proxy for two GI airguns within the Nucleus modeling software and assumed a maximum tow depth of 2 m. LDEO also used a correction factor of 1.5 to derive relevant zones for intermediate water depths from modeled deep-water results⁶. However, LDEO has not substantiated the applicability of the 1.5 correction factor in environments other than the Gulf of Mexico and has provided no evidence that the 1.5 correction factor is appropriate when using LDEO's model to estimate the relevant zones for the two G guns that will be used off New Zealand, nor has it substantiated the use of its model for deep water depths outside the Gulf of Mexico.

Because LDEO has failed to verify the applicability of its model to conditions outside the Gulf of Mexico, the Commission has recommended in many of its letters that NMFS and/or applicants estimate exclusion and buffer zones using either empirical measurements from the particular survey site or a model that accounts for the conditions in the proposed survey area. The model should incorporate site-specific environmental⁷ and operational⁸ parameters. The Commission understands that LDEO has been analyzing hydrophone data from waters off Washington State⁹ to allow comparisons of empirically derived estimates to model-estimated exclusion and buffer zones. Crone et al. (2014) indicated that the zones can be reliably established with the hydrophone streamer only in shallow water, perhaps in depths no greater than about 200 m. They also stated that additional investigations into the use of hydrophone data for the determination of sound power levels from previous surveys, and perhaps new targeted calibration experiments, could help refine the effects of water depth and seafloor slope on power levels measured with the streamer in intermediate-depth waters and provide more concrete guidelines on the depth ranges for which the streamer can be reliably used for sound power level estimates¹⁰. Further, Crone et al. (2014) indicated that the modeled zones were greater than the measured zones in waters 200 m or less, which could be due to differences in bottom and sub-bottom properties between the Washington and the Gulf of Mexico sites—some of the very factors that the Commission believes should be included in the model.

In general, the Commission does not support LDEO's continued use of a simplistic model and various correction factors because it is not based on best available science. This is particularly

⁶ Based on past practice and empirical measurements from the 36-airgun array in the Gulf of Mexico from Diebold et al. (2010).

⁷ Such as sound speed profiles, refraction in the water column, bathymetry/water depth, sediment properties/bottom loss, and wind speed.

⁸ Such as tow depth, source level, number/spacing of active airguns.

⁹ And New Jersey.

¹⁰ Moreover, hydrophone streamers measure power levels in one direction (behind the vessel) only. Previous studies have indicated that power levels vary as a function of azimuth.

true for the environmental conditions in the New Zealand survey area¹¹, which should include sound speed profiles that represent cold-water conditions (increased sound speeds), surface ducts, and in-water refraction, as well as bathymetry and sediment characteristics that reflect sound—parameters that are not accounted for in LDEO’s model. Therefore, the Commission recommends that NMFS (1) require Scripps to have LDEO re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific environmental (including sound speed profiles, bathymetry, and sediment characteristics at a minimum) and operational (including number/type of airguns, tow depth) parameters for the proposed incidental harassment authorization and (2) impose the same requirements for all future incidental harassment authorizations submitted by Scripps, NSF, LDEO, USGS, Antarctic Contract Support (ASC), or any other relevant entity. The Commission also continues to believe that Scripps, NSF, LDEO and related entities (ASC, USGS) should be held to the same standard as other action proponents (i.e., U.S. Navy, Air Force, Bureau of Ocean Energy Management, and the oil and gas industry).

Species proposed to be taken

As stated previously, there is a dearth of available marine mammal data for waters off New Zealand. NMFS indicated that it discounted 18 marine mammal species with ranges that may potentially occur in the southwest Pacific Ocean and/or are in the stranding record—NMFS based that presumption on Baker et al. (2010) and their categorizing those species as ‘vagrants’. However, many other action proponents include certain species (including Arnoux’s beaked whales, pygmy beaked whales, and Risso’s dolphins) in their marine mammal impact assessments¹² for seismic activities off New Zealand. Those species also are present in the DOC’s sightings database for marine mammals present (either alive or stranded) in New Zealand’s waters. Because Arnoux’s and pygmy beaked whales are not thoroughly studied and their habitat ranges are poorly understood¹³, the Commission believes that it would have been prudent for NMFS to include them in the proposed authorization since they have been observed dead-stranded in New Zealand. Similarly, the range of Risso’s dolphins does overlap with New Zealand waters based on information on various government websites, including NMFS’s website¹⁴. Further, Risso’s dolphins have been observed in New Zealand both alive¹⁵ and dead. Thus, the Commission believes the potential to take those species exists and recommends that NMFS include Arnoux’s beaked whales, pygmy beaked whales, and Risso’s dolphins in its incidental harassment authorization and authorize the associated takes based on group size.

Monitoring measures

In previous letters, the Commission has indicated that the measures in support of monitoring and reporting requirements under section 101(a)(5) of the MMPA need to be sufficient to provide a reasonably accurate assessment of the manner of taking and the numbers of animals taken incidental to the specified activity. A key goal of those requirements should be to verify that

¹¹ Which differ substantially from warm- or temperate-water regions where LDEO normally operates.

¹² As required by New Zealand’s Department of Conservation (DOC) and its 2013 Code of Conduct for Minimizing Acoustic Disturbance to Marine Mammals from Seismic Survey Operations.

¹³ Although the assumed range of Arnoux’s beaked whales does include waters off New Zealand.

¹⁴ <http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rissosdolphin.htm>.

¹⁵ News articles have indicated that DOC has estimated approximately 2,000 Risso’s dolphins occur in New Zealand waters.

the assessments and assumptions underlying the issuance of the authorization were correct and to confirm that only small numbers of marine mammals are being taken and that the impacts are negligible. The Commission continues to believe those assessments need to account for all animals in the project area, including those animals directly on the trackline that are not detected and how well animals are detected based on the distance from the observer, which are accounted for by $g(0)$ and $f(0)$ values. In the past, NMFS has indicated that those assessments could be qualitative or relative in nature, or they could be more directly quantitative (79 Fed. Reg. 38503). More recently, NMFS indicated that comparing the actual total area ensonified after the survey to the predicted total area ensonified should result in an even more accurate evaluation of exposed animals, which could then be compared to the numbers of animals actually detected to have some sense of how the estimates compare to real likely exposure (80 Fed. Reg. 4891). The Commission disagrees for the reasons specified herein.

First, in-situ sound measurements would have to be collected to compare accurately the actual total ensonified area to that which was predicted. However, very few action proponents conduct such measurements and analyses. Rather, NMFS may have been suggesting that the actual total ensonified area be compared to the predicted total ensonified area based on the length of tracklines surveyed and the associated ensonified area. In either instance, NMFS would be assuming that the uniform species-specific densities used to predict the numbers of animals to be taken would equate directly to those animals actually taken during the survey. That assumption does not support NMFS's own acknowledgement that marine mammals are distributed patchily—based on species-specific group size and behavior state. Furthermore, NMFS indicated that the number of marine mammals detected during the geophysical surveys is a small percentage of those predicted to be taken, which is expected due to marine mammals spending a large portion of their time underwater (80 Fed. Reg. 4891). It is that latter factor that the Commission has repeatedly recommended that NMFS and LDEO incorporate in their monitoring efforts.

The Commission continues to believe that $g(0)$ and $f(0)$ values¹⁶ should be based on the ability of protected species observers to detect marine mammals rather than on hypothetically optimal estimates derived from scientific surveys¹⁷ (e.g., from NMFS's shipboard abundance surveys). The Commission also understands that LDEO (and relevant entities) collects, and has been collecting for many years, sightings data when the airguns are active and inactive. Those data could be pooled amongst similar survey types (e.g., based on geographical location, array configuration, airgun activity status, vessel-specific observational parameters) to determine rudimentary $g(0)$ and $f(0)$ values—an analysis that has been discussed with NMFS, LDEO, and relevant entities in the past. The Commission acknowledges that those values may not be as accurate as using a well-planned, randomized sampling design typically used during marine mammal scientific surveys, but adjusting by those rudimentary values would be preferable to assuming that only those animals detected during the survey equated to the total numbers taken, which is clearly an underestimate of reality.

Therefore, the Commission again recommends that NMFS consult with LDEO and other relevant entities (e.g., NSF, USGS, ASC, Scripps) to develop, validate, and implement a monitoring

¹⁶ These values vary based on platform characteristics, observer skill, environmental conditions, and sightability and detectability of the species.

¹⁷ Values that the Commission understands LDEO and relevant entities incorporated in past monitoring reports.

program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal takes and reliable estimates of the numbers of marine mammals taken by incorporating appropriate estimates of $g(0)$ and $f(0)$ values derived from protected species observer data collected during geophysical surveys. Although the Commission has made this recommendation in numerous previous letters, the Commission believes that NMFS may have misinterpreted it. NMFS recently stated that it does not believe it is appropriate to require NSF to collect information in the field to support the development of survey-specific correction factors (80 Fed. Reg. 4862). The Commission never suggested that correction factors be developed for every survey. Rather, it is important for NSF, LDEO, and other relevant entities to continue to collect appropriate sightings data in the field to be pooled to determine $g(0)$ and $f(0)$ values relevant to the various geophysical survey types. The Commission would welcome another meeting to help further this goal.

The Commission looks forward to collaborating with NMFS on the various guidance documents and issues raised in this letter. Please contact me if you have questions concerning the Commission's recommendations.

Sincerely,



Rebecca J. Lent, Ph.D.
Executive Director

Enclosure

References

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MARINE MAMMAL COMMISSION

8 December 2014

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application submitted by the National Science Foundation (NSF) Division of Polar Programs and Antarctic Support Contract (ASC)¹ seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act (the MMPA) to take small numbers of marine mammals by harassment. The taking would be incidental to a marine geophysical survey to be conducted in the Ross Sea in January and February 2015. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 17 November 2014 notice announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (79 Fed. Reg. 68512).

Some issues raised in previous Commission letters regarding similar geophysical surveys reflect ongoing concerns that apply more broadly to incidental take authorization applications, not just those from NSF and ASC. The Commission has recommended numerous times that NMFS adjust density estimates used to estimate the numbers of potential takes by incorporating some measure of uncertainty when available density data originate from other geographical areas and temporal scales² and that it formulate a policy or other guidance setting forth a consistent approach for how applicants should incorporate uncertainty in density estimates. The Commission also has recommended that NMFS follow a consistent approach in assessing the potential for taking by Level B harassment from exposure to specific types of sound sources (e.g., echosounders, sub-bottom profilers, side-scan sonar, and fish-finding sonar) by all applicants who propose to use them³. In addition, despite repeated recommendations from the Commission that it do so, NMFS has yet to develop a clear policy setting forth more explicit criteria and/or thresholds for making small numbers and negligible impact determinations. The Commission understands that NMFS is in the process of developing clearer policies and guidance to address these concerns. The Commission

¹ NSF and ASC submitted the application on behalf of Louisiana State University. NSF is funding the research, and ASC would operate the source vessel.

² Including the age of the data.

³ Please refer to the Commission's 30 January 2014 letter detailing its rationale.

welcomes the opportunity to work with NMFS as it develops these broadly applicable policies, and in making determinations specific to NSF and ASC applications.

Background

NSF and ASC propose to conduct a low-energy geophysical survey in the Ross Sea. The purpose of the proposed survey is to evaluate the timing and duration of two grounding events (i.e., advances of grounded ice) within the Whales Deep Basin in the eastern Ross Sea. The survey would be conducted in waters estimated to be 100–1,000 m in depth with approximately 1,750 km of tracklines. The R/V *Nathaniel B. Palmer* would tow a two-airgun array (nominal source level of 234 dB re 1 μ Pa at 1 m (peak) with a maximum discharge volume of 210 in³) at 3–4 m depth. The *Palmer* also would tow one or two hydrophone streamers, 100 m in length, during the survey. ASC would operate a single-beam echosounder (at 3.5 kHz for bottom-tracking and 12 kHz for sub-bottom profiling purposes), a multibeam echosounder (at 12 kHz), an acoustic Doppler current profiler (ADCP; at 150 kHz), and acoustic pingers and deploy up to 50 expendable bathythermographs throughout the survey. In addition, ASC would collect core samples using various sampling devices.

NMFS preliminarily has determined that, at most, the proposed activities would result in a temporary modification in the behavior of small numbers of up to 18 species of marine mammals and that any impact on the affected species would be negligible. NMFS does not anticipate any take of marine mammals by death or serious injury. It also believes that the potential for temporary or permanent hearing impairment will be at the least practicable level because of the proposed mitigation and monitoring measures. Those measures include (1) monitoring exclusion and buffer zones, (2) using shut-down and ramp-up procedures, and (3) speed and course alterations, if safe and practicable.

Despite repeated recommendations in previous letters and discussions regarding the Commission's concerns with NMFS, NSF, Lamont-Doherty Earth Observatory (LDEO), and U.S. Geological Survey (USGS), some major issues remain unresolved. These ongoing concerns are summarized in the following sections.

Uncertainty in modeling exclusion and buffer zones

Since 2010 the Commission has identified issues with the method used to estimate exclusion and buffer zones (based on Level A and B harassment, respectively) and the numbers of takes incidental to NSF-funded geophysical research. Briefly, LDEO performs acoustic modeling for geophysical research funded by NSF. For at least 6 years (and likely more than the last 10 years), LDEO has estimated exclusion and buffer zones using a simple ray trace-based modeling approach that assumes spherical spreading, a constant sound speed, and no bottom interactions (Diebold et al. 2010). As noted in the Commission's previous letters (see the Commission's 18 August 2014 letter), numerous studies⁴ have underscored the importance of incorporating site-specific environmental and operational parameters into estimating exclusion and buffer zones. The recent Crone et al. (2014)⁵ study indicated that, in shallow and sloped environments, the complexity of local geology

⁴ Tolstoy et al. (2004), Tolstoy et al. (2009), Diebold et al. (2010), and most recently, Crone et al. (2014).

⁵ Crone et al. (2014) used hydrophone data from waters off Washington State to compare empirically derived estimates to model-estimated exclusion and buffer zones for the 36-airgun array.

and bathymetry and the typical lack of sufficient information regarding this complexity can make it difficult to predict accurately sound levels as a function of distance from the source array. In contrast to the facts in the applicable scientific literature, LDEO's model does not incorporate environmental characteristics of the specific study area, including sound speed profiles and refraction within the water column, bathymetry/water depth, sediment properties/bottom loss, or absorption coefficients. Nevertheless, LDEO continues to assert that its model generally is conservative⁶ when compared to in-situ sound propagation measurements (based primarily on measurements made in the Gulf of Mexico), a conclusion with which the Commission disagrees.

To estimate the proposed exclusion and buffer zones for the survey in the Ross Sea, LDEO used two G airguns as a proxy for two GI airguns within the Nucleus modeling software and assumed a maximum tow depth of 4 m. LDEO also used a correction factor of 1.5 to derive relevant zones for intermediate water depths from modeled deep-water results⁷. However, LDEO has not substantiated the applicability of the 1.5 correction factor in environments other than the Gulf of Mexico and has provided no evidence that the 1.5 correction factor is appropriate when using LDEO's model to estimate the relevant zones for the two G guns that will be used in the Ross Sea. LDEO indicated in other recent authorization applications that its calibration data show that, at greater distances (4 to 5 km), sound reflected from the sea floor and refracted from the sub-seafloor dominates, while the direct arrivals become weak and/or incoherent (Figures 11, 12, and 16 in Appendix H of the NSF/USGS programmatic environmental impact statement for geophysical surveys (PEIS)). LDEO stated that aside from local topography effects, the region around the critical distance (~5 km in Figures 11 and 12 and ~4 km in Figure 16 in Appendix H of the NSF/USGS PEIS) is where the observed sound levels rise very close to the mitigation model curve. Although the observed sound levels occur primarily below the mitigation model curve, that finding further substantiates the fact that the model is not necessarily representative of site-specific environmental conditions, including bathymetry and sound speed profiles. As the Commission has explained in previous letters, the reflective/refractive arrivals are the very measurements that should be accounted for in site-specific modeling and that ultimately determine underwater sound propagation.

Because LDEO has failed to verify the applicability of its model to conditions outside the Gulf of Mexico, the Commission has recommended in many of its letters that NMFS and/or applicants estimate exclusion and buffer zones using either empirical measurements from the particular survey site or a model that accounts for the conditions in the proposed survey area. The model should incorporate site-specific environmental⁸ and operational⁹ parameters.

In March 2013, LDEO indicated that it might be able to compare its model to hydrophone data collected during previous surveys in environmental conditions other than those in the Gulf of Mexico (i.e., deep and intermediate waters in cold-water environments that may have surface ducting conditions, shallow-water environments, etc.). The Commission understands that LDEO has been analyzing hydrophone data from waters off Washington State to allow comparisons of empirically

⁶ It overestimates the distances to the various thresholds.

⁷ Based on past practice and empirical measurements from the 36-airgun array in the Gulf of Mexico from Diebold et al. (2010).

⁸ Such as sound speed profiles, refraction in the water column, bathymetry/water depth, sediment properties/bottom loss, and wind speed.

⁹ Such as tow depth, source level, number/spacing of active airguns.

derived estimates to model-estimated exclusion and buffer zones. Crone et al. (2014) indicated that the zones can be reliably established with the hydrophone streamer only in shallow water, perhaps in depths no greater than about 200 m. They also stated that additional investigations into the use of hydrophone data for the determination of sound power levels from previous surveys, and perhaps new targeted calibration experiments, could help refine the effects of water depth and seafloor slope on power levels measured with the streamer in intermediate-depth waters and provide more concrete guidelines on the depth ranges for which the streamer can be reliably used for sound power level estimates¹⁰. Further, Crone et al. (2014) indicated that the modeled zones were greater than the measured zones in waters 200 m or less, which could be due to differences in bottom and sub-bottom properties between the Washington and the Gulf of Mexico sites—some of the very factors that the Commission believes should be included in the model.

The Commission is pleased that LDEO has analyzed hydrophone data from waters off Washington State to compare empirically measured to model-estimated exclusion and buffer zones. However, LDEO would need to make such comparisons at various sites, not just in waters off Washington, if it intends to continue using a model that does not incorporate site-specific parameters. The Commission stands by its recommendations in its 24 June 2013 letter that such comparisons be made and the results incorporated in any incidental harassment applications for geophysical surveys to be conducted in 2014. The Commission further recommended that, if LDEO and NSF either do not have enough data to compare LDEO's modeled results to other environments, or choose not to assess the accuracy of the model, then they should re-estimate the exclusion and buffer zones and associated takes of marine mammals using site-specific environmental parameters (including sound speed profiles, bathymetry, and bottom characteristics) for all future applications that use LDEO's model. Neither approach was used for any of the proposed incidental harassment authorizations in 2014, including the currently proposed authorization.

In addition, the Commission disagrees with NMFS's conclusion that NSF, LDEO, and other relevant entities (USGS, Scripps Institution of Oceanography (Scripps)) are providing sufficient scientific justification for their take estimates, given the continued use of LDEO's simplistic model and various correction factors that are not grounded in rigorous science. This is particularly true for the environmental conditions in the Antarctic survey area¹¹, which should include sound speed profiles that represent cold-water conditions (increased sound speeds), surface ducts, and in-water refraction, as well as bathymetry and sediment characteristics that reflect sound. None of these parameters are accounted for in LDEO's model. Given NSF's and LDEO's participation in the January 2014 sound exposure modeling workshop¹² at which experts confirmed that sound speed profiles and bathymetry/sediment characteristics were the most important factors affecting underwater sound propagation and should be included in related modeling, this is a deficiency that the Commission expects the applicants to take more seriously.

For all of these reasons, the Commission remains concerned that the LDEO model is not based on the best available science and does not support its continued use. Therefore, the

¹⁰ Moreover, hydrophone streamers measure power levels in one direction (behind the vessel) only. Previous studies have indicated that power levels vary as a function of azimuth.

¹¹ Which differ substantially from warm- or temperate-water regions where LDEO normally operates.

¹² Which was held in Washington, DC, and was attended by NMFS, the Commission, and USGS as well.

Commission recommends that NMFS (1) require NSF and ASC to have LDEO re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific environmental (including sound speed profiles, bathymetry, and sediment characteristics at a minimum) and operational (including number/type of airguns, tow depth) parameters for the proposed incidental harassment authorization and (2) impose the same requirements for all future incidental harassment authorizations submitted by NSF, ASC, LDEO, USGS, Scripps, or any other relevant entity. This is something that other applicants (the Navy, Air Force, Bureau of Ocean Energy Management, oil and gas industry, etc.) have done and continue to provide. The Commission believes that LDEO, NSF, and related entities (ASC, USGS, Scripps) should be held to that same standard.

NMFS recently indicated that it does not prescribe the use of any particular modeling package and does not believe it is appropriate for it to do so (79 Fed. Reg. 38499). The Commission agrees that NMFS should not instruct applicants to use specific contractors or modeling packages, but it should strive to use the best available science in conducting its analyses and reviews. At the absolute minimum, applicants need to submit sufficient information to demonstrate that the applicable requirements for obtaining an incidental harassment authorization have been met. The Commission does not believe that wholesale application of a model based on information from one area applied to another with very different environments, particularly one that ignores site-specific environmental and operational parameters, meets this standard.

Monitoring measures

In previous letters, the Commission has indicated that monitoring and reporting requirements under section 101(a)(5) of the MMPA need to be sufficient to provide a reasonably accurate assessment of the manner of taking and the numbers of animals taken incidental to the specified activity. A key goal of monitoring and reporting should be to verify that the assessments and assumptions underlying the issuance of the authorization were correct and to confirm that only small numbers of marine mammals are being taken and that the impacts are negligible. The Commission continues to believe those assessments need to account for all animals in the project area, including those at the surface but not detected and those underwater and not available for sighting, which are accounted for by $g(0)$ and $f(0)$ values. NMFS's recent responses to the Commission's comments suggested that the applicable implementing regulations require that monitoring be designed only to provide "an increased knowledge of the species [and] the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities" In NMFS's view, this increased knowledge of the level of taking could be qualitative or relative in nature, or it could be more directly quantitative (79 Fed. Reg. 38503).

The Commission continues to believe that the best interpretation of the applicable regulations is that the monitoring and reporting requirements be sufficient to provide reasonably accurate information on the level of taking and/or the impacts on the affected populations. Such an interpretation is consistent with the underlying statutory purposes monitoring and reporting requirements, which should do more than just incrementally advance our knowledge of the species. Rather, it should be designed to provide adequate information to assess whether the issuance criteria are in fact being met. From this perspective, the correct interpretation of the provision is that the applicant should propose monitoring and reporting measures that will (1) increase knowledge regarding the species (and how it might be affected by the activities causing the taking) and (2)

provide the relevant information regarding the types and levels of incidental taking that occur and the impacts of such taking on the affected marine mammal populations. Such an interpretation is consistent with the statutory structure, which under section 101(a)(5)(D)(iv) requires that NMFS “modify, suspend, or revoke an authorization” if it finds, among other things, that the authorized taking is having more than a negligible impact or that more than small numbers of marine mammals are being taken.

NMFS has incorrectly characterized the Commission’s past comments as advocating that monitoring conducted by an authorized entity always be sufficient to quantify “the exact number of takes” that occurred during the action (79 Fed. Reg. 60817). While that may be the ideal, the Commission recognizes that it cannot be achieved regularly in practice. Nevertheless, the Commission believes that NMFS should design monitoring and reporting requirements that provide considerably more than rough, qualitative information. The specified monitoring and reporting requirements need to be sufficient to provide reasonably accurate information on the numbers of marine mammals being taken and the manner in which they are taken, not merely better information on the qualitative nature of the impacts.

Specifically for those geophysical surveys conducted in 2013 (most of which were funded by NSF) for which monitoring reports have been made available, the contractors stated that the numbers of takes observed very likely were underestimates and provided the absolute minimum number of animals actually exposed. They noted that some animals were likely not seen or had moved away before being observed. In addition to observations missed during nighttime hours, the entire Level B harassment zone was not visible on several occasions due to fog during daytime hours. Accordingly, the Commission reiterates its assertion that appropriate $g(0)$ and $f(0)$ values are essential for making accurate estimates of the numbers of marine mammals taken during surveys. To be applicable for the proposed survey, the correction factors should be based on the ability of protected species observers to detect marine mammals rather than on hypothetically optimal estimates derived from scientific surveys (e.g., from NMFS’s shipboard abundance surveys).

Therefore, the Commission again recommends that NMFS consult with NSF, ASC, and other relevant entities (e.g., LDEO, USGS, Scripps) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal takes and reliable estimates of the numbers of marine mammals taken by incorporating applicable $g(0)$ and $f(0)$ values. NMFS recently stated that it does not generally believe that post-activity take estimates using $f(0)$ and $g(0)$ are *required* to meet the monitoring requirement of the MMPA in the context of the NSF and LDEO monitoring plan. However, NMFS did agree that developing and incorporating a way to better interpret the results of their monitoring (perhaps a simplified or generalized version of $g(0)$ and $f(0)$) is a good idea. NMFS further stated that it would consult with the Commission and NMFS scientists prior to finalizing the recommendations (79 Fed. Reg. 38503). The Commission welcomes a meeting to further that goal.

Ms. Jolie Harrison
8 December 2014
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The Commission looks forward to collaborating with NMFS on the various guidance documents and issues raised in this letter. Please contact me if you have questions concerning the Commission's recommendations.

Sincerely,



Rebecca J. Lent, Ph.D.
Executive Director

Cc: Holly Smith, National Science Foundation
Helene Carton, Lamont-Doherty Earth Observatory

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ITP Goldstein - NOAA Service Account <itp.goldstein@noaa.gov>

0648-XD727 Comments on proposed seismic survey in New Zealand waters

Elisabeth Slooten <liz.slooten@otago.ac.nz>

Sat, Apr 11, 2015 at 5:24 PM

To: "ITP.Goldstein@noaa.gov" <ITP.Goldstein@noaa.gov>

Thank you for the opportunity to provide input on the proposal by Scripps Institution of Oceanography to carry out a geophysical survey in New Zealand (NZ) waters, using air guns, a multibeam echosounder and sub-bottom profiler. Below are my comments on the "Draft Environmental Analysis" (EA) prepared for Scripps by LGL Ltd (LGL Report FA00028-1, dated 9 December 2014).

A marine mammal survey is required before the number of marine mammals affected, and the population-level consequences can be assessed. This would require changing the timing of the survey, to occur after a marine mammal survey and after data analysis to estimate the potential number of marine mammals affected and the potential level of impact (Alternative 1, Survey Timing). Depending on the results of the marine mammal survey, Alternative 2 (No Action) may be the appropriate decision.

The AE identifies New Zealand as a hotspot for marine mammal species richness and lists several endangered species found in NZ waters. The AE explains that the only marine mammal surveys in NZ waters have focused on inshore waters and that large-scale surveys are lacking. These conclusions support the need for a marine mammal survey, as would be required under US legislation.

In the absence of a marine mammal survey, LGL have:

1. Used "various sources", consisting mostly of anecdotal information, to "describe the occurrence of marine mammals in the waters of New Zealand" (page 16 of AE).
2. Combined these anecdotal accounts of marine mammals in NZ waters with marine mammal survey data from Oregon, Washington State and California, in order to provide a crude estimate of the potential numbers of cetaceans exposed to specific sound levels (section IV.3 of the AE).

This is not a scientifically robust approach. There are serious problems with the EA's descriptions of the New Zealand marine mammal distribution information. In addition, the US data are clearly not applicable to NZ waters.

The descriptions of marine mammal distribution, based on anecdotal data, consists of very broad statements such as "Sperm whales, particularly adult males, are likely

to be seen in the proposed survey areas during May-June." Much of the information is out of date or based on public education material found on webpages, rather than the relevant primary scientific literature.

For example, the section on Hector's dolphin includes the statement:

"In general, Hector's dolphins prefer waters <90 m deep (Bräger et al. 2003; Rayment et al. 2006; Slooten et al. 2006) within 10 km from shore (Hutchings 2013)."

Rayment et al. (2006) and Slooten et al. (2006) are published papers in scientific journals, describing population surveys. However, Hutchings (2013) is a reference to an online encyclopedia. The scientific literature shows that the offshore distribution of Hector's dolphin extends to the 100 m depth contour, with most sightings in waters < 100 m deep, but some sightings in waters up to 200 and 300 m deep. Offshore distances depend on water depth and extend to at least 60 nautical miles (more than 100 km) offshore.

As stated in the AE, Hector's dolphin is an endangered species endemic to NZ, and is found in inshore waters adjacent to all three of the proposed study sites. Hector's dolphins would be exposed to noise from the proposed activity. The South Island east coast has relatively high densities of Hector's dolphins, which would result in relatively larger numbers of individuals exposed. The North Island east coast has very low densities and this is a very high risk area for the species. The range of the species is highly fragmented. The east coast of the North Island is one of several areas where Hector's dolphins (the species as a whole) were once much more common than they are today.

The AE correctly identifies the east coast of the North Island as habitat for Hector's dolphins and explains that it is not clear whether these are the North or South Island subspecies. The AE does not include any proposed follow-up in terms of gathering data on this small population. For example, carrying out a marine mammal survey or estimating the risk of the proposed seismic work (e.g. risk of behavioural reactions and/or further population fragmentation).

The AE mentions that the North Island subspecies, also known as Maui's dolphin, is listed as Critically Endangered, but does not mention the population estimate of 55 individuals (95% Confidence Interval 48-69; Hamner et al. 2012, 2013).

There is no scientific basis for the statement: "Marine mammals and sea turtles are known to occur in the proposed survey area. However, the number of individual animals expected to be approached closely during the proposed activities would be relatively small in relation to regional population sizes." There are no regional population size estimates and insufficient survey data to estimate the number of animals expected to be approached closely or exposed to noise from the air guns and other equipment to be used in the proposed survey.

Other important information, currently lacking, is the potential impact on these populations. (e.g. potential for further population fragmentation of Maui's dolphins and other species).

Alternative E2 (use of alternative technologies) should be given much more discussion, before a decision is made as to whether the proposed seismic work should go ahead. The EA mentions that, in the view of LGL, alternative technologies are either not feasible or not commercially viable or not fit for purpose. No data are provided to support these statements. For example, it is not clear which of the alternative technologies (listed in section 2.6 of the PEIS) are considered not commercially viable. Data should be provided on the financial cost and potential reduction of environmental impact for these alternative technologies.

The EA should make it clear that the "minimum of one" MMO proposed in the EA would see a small fraction of the marine mammals in the area, especially considering the distances over which the noise produced by the geophysical work would be audible. For example, research by Barlow and Gisiner (2006) and others, indicates that MMOs have a very low probability of detecting marine mammals, even close to the vessel (e.g. 2% probability of detecting beaked whales). A representative of the oil and gas industry recently described observers on seismic vessels as "window dressing" (Hughes 2015).

Describing ramp ups and shut downs that rely on MMOs visually detecting marine mammals as "mitigation measures" and "protection measures" suggests that these actions result in measurable and biologically meaningful reductions in environmental impact. If there is scientific evidence to support this suggestion, it should be included in the EA. If there is no scientific support, the EA should make it clear that there is no evidence that these measures are effective as mitigation or protection measures.

The EA indicates that there will be "no start ups during poor visibility or at night". This makes sense and should be extended to not using any equipment producing loud noise during poor visibility or at night (i.e. air guns, multibeam echosounder, sub-bottom profiler). The proposal for a more cautious approach at night and during poor visibility indicates that Scripps/LGL recognise that the MMO will be unable to detect marine mammals near the vessel at those times. It is therefore surprising that there is no proposal to use Passive Acoustic Monitoring (PAM) for marine mammals. I presume this would be a routine requirement in US waters.

Appendix 1 below provides a brief summary of marine mammal sightings in the Kaikoura area from the Otago University Marine Mammal Research Group. We would be happy to provide more details (e.g. number of sightings and sighting rate per unit of effort) but would need more time for this work. It's unfortunate that Scripps did not make contact with New Zealand marine mammal scientists earlier, in order to obtain regionally relevant sightings data. The Society for Marine Mammalogy

conference in New Zealand in December 2013 would have been an excellent opportunity to present a talk about the proposed survey and make contact with local researchers. The Society for Marine Mammalogy is based in the USA. Many of its US members have active research collaborations with marine mammal scientists in New Zealand and Australia, including scientists from NMFS La Jolla, which is located on the same campus as Scripps.

The EA fails to include several important publications, including Barlow and Gisiner (2006). In general, the EA tends to understate the potential impacts of the proposed activity. A second draft of the EA should be prepared, with a more comprehensive literature review including key recent scientific publications that highlight the potential impacts of seismic surveys, to avoid over-representing literature that downplays the impacts.

The southern site, off New Zealand's South Island is described as a "contingency area that would only be surveyed if time permits". On the basis of currently available scientific data (Appendix 1) this is a high risk area in terms of marine mammal density. In addition, the southern area has steep depth contours relatively close to shore.

The beaked whale stranding in Mexico during a US scientific seismic survey (Taylor 2004) highlighted two potential risk factors: 1. The ship was moving from deep water towards a shallower coastal area. 2. The ship used a Sub-Bottom Profiler (SBP) in addition to air guns. The SBP could have been a contributing factor in forcing the beaked whales into shallow water. The whales could have been herded ahead of the ship and found themselves in water that was too shallow to allow them to regulate their nitrogen levels. They may have out-gassed and died from the bends, or travelled rapidly towards the shore to avoid the noise resulting in a stranding.

A marine mammal survey is needed to determine if the southern area should be removed from the proposal, or if the proposal as a whole should be declined.

Hope these comments (and data) help with your assessment of the proposal.

Professor Liz Slooten, Zoology Department, Otago University, Dunedin, New Zealand

Scientific publications referred to above:

Barlow J and Gisiner R. 2006. Mitigating, monitoring and assessing the effects of anthropogenic sound on beaked whales. *Journal of Cetacean Research and Management* 7: 239-249.

Hamner RM, Oremus M, Stanley M, Brown P, Constantine R, Baker CS (2012) Estimating the abundance and effective population size of Maui's dolphins using

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Long range movement by Hector's dolphins, provides potential genetic enhancement for critically endangered Maui's dolphin. *Marine Mammal Science* 30: 139-153.

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Taylor B, Barlow J, Pitman R, Ballance L, Klinger T, DeMaster D, Hildebrand J, Urban J, Palacios D and Mead J. 2004. A call for research to assess risk of acoustic impact on beaked whale populations. Presented to the Scientific Committee of the International Whaling Commission, Sorento, 2004.

Appendix 1

Brief summary of cetacean sightings off Kaikoura, New Zealand

Below is a list of cetacean species sighted at Kaikoura by members of the Marine Mammal Research Group at the University of Otago between 1990 and 2015, while carrying out research on sperm whales. We would be happy to provide more information, including numbers of sightings and sightings per unit field effort.

Residents year-round at Kaikoura

Sperm whales (*Physeter macrocephalus*)

Dusky dolphins (*Lagenorhynchus obscurus*)

Hector's dolphins (*Cephalorhynchus hectori*)

Frequent visitors (more than two sighting per year, every year)

Humpback whales (*Megaptera novaeangliae*) – May to December

Pilot whales (*Globicephala melas*) – January and February

Killer whales (*Orcinus orca*) – any month of the year, mostly November and December

Blue whales (*Balaenoptera musculus*) – mostly December

Common dolphins (*Delphinus capensis*) – mostly January and February

Occasional sightings (one or two sightings per year and not every year)

Bottlenose dolphins (*Tursiops truncatus*)

Southern right whale dolphin (*Lissodelphis peronii*)

Southern right whale (*Eubalaena australis*)

Pygmy right whale (*Caperea marginata*)

Southern bottlenose whale (*Hyperoodon planifrons*)

Fin whale (*Balaenoptera physalus*)

Minke whale (*Balaenoptera acutorostrata*)



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Fw:public on federal register

Jean Public <jeanpublic1@yahoo.com>

Sun, Mar 22, 2015 at 6:33 PM

Reply-To: Jean Public <jeanpublic1@yahoo.com>

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i thoroughly oppose giving permission to these profitter to kill marine life by new zealand. there is no reason for the usa to be spending our taxa dollars in that part of the world. its time to get our american tax dollars back into america. the nsf is notorious for wasting american tax dollars. this comment is for the public record. please receipt. jean pubjeanpublic1@yahoo.comlic

[Federal Register Volume 80, Number 54 (Friday, March 20, 2015)]
[Notices]

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From the Federal Register Online via the Government Printing Office
[www.gpo.gov]

[FR Doc No: 2015-06261]

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Vol. 80

Friday,

No. 54

March 20, 2015

Part II

Department of Commerce