MARINE MAMMAL COMMISSION

23 July 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 U.S. Geological Survey (USGS), Lamont-Doherty Earth Observatory (LDEO), and 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 the east coast of the United States. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 23 June 2014 notice announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (79 Fed. Reg. 35642).

Some issues raised in previous letters regarding geophysical surveys reflect Commission concerns that apply more broadly to incidental take authorization applications beyond USGS's proposed application. The Commission has recommended numerous times that NMFS adjust density estimates using some measure of uncertainty when available density data originate from different geographical areas and temporal scales and that it formulate policy or guidance shaping a consistent approach for how applicants should incorporate uncertainty in density estimates. NMFS has indicated that it is currently evaluating available density information and working on guidance that would outline a consistent approach for addressing uncertainty in specific situations where certain types of data are or are not available (78 Fed. Reg. 57354). Further, the Commission has recommended that NMFS follow a consistent approach of requiring the assessment of Level B harassment takes for specific types of sound sources (e.g., sub-bottom profilers, echosounders, side-scan sonar, and fish-finding sonar) by all applicants who propose to use them. NMFS has indicated that it is evaluating the broader use of those types of sources to determine under what specific circumstances requests for incidental taking would be advisable (or not) and also is working on guidance that would outline a consistent approach for addressing potential impacts from those types of sources (78 Fed. Reg. 57354). The Commission welcomes the opportunity to meet with NMFS to review these higher-level recommendations, as well as those specific to USGS's application.

BACKGROUND

USGS, with LDEO as the operator, proposes to conduct a high-energy, 2D geophysical survey in the U.S. exclusive economic zone (EEZ) and international waters of the northwest Atlantic Ocean from New England to Florida. The purpose of the proposed survey is to identify the outer limits of the U.S. continental shelf and study the sudden mass transport of sediments down the continental shelf that may pose significant tsunami-related hazards to Atlantic and Caribbean coastal communities. The survey would be conducted in waters estimated to be 1,400 to greater than 5,400 m in depth with approximately 3,165 km of tracklines during both phase I (up to 18 days in August–September 2014) and phase II (up to 18 days between April and August 2015). LDEO would use the R/V *Marcus G. Langseth*, owned by NSF, to operate a 36-airgun array (nominal source levels 236 to 265 dB re 1μPa (peak-to-peak)) at 9 m depth. The *Langseth* also would tow one hydrophone streamer, 8,000 m in length, during the survey. In addition, LDEO would operate a 10.5- to 13-kHz multibeam echosounder and a 3.5-kHz sub-bottom profiler continuously 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 34 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 monitoring exclusion and buffer zones and using power-down, shut-down, and ramp-up procedures. In addition, USGS would shut down the airguns immediately if and when a North Atlantic right whale is sighted, regardless of the distance from the *Langseth*. Ramp-up procedures would not be initiated until the right whale has not been seen at any distance for 30 minutes. Further, USGS would power down the array, if possible, when concentrations of humpback, sei, fin, blue, and/or sperm whales (six or more individuals that do not appear to be traveling and are feeding, socializing, etc.) are observed within the Level B harassment zone (based on 160 dB re 1 μPa).

Staff members from NMFS, NSF, USGS, LDEO, and the Commission met in March 2013 to discuss some of the Commission's ongoing concerns regarding the potential effects of geophysical surveys. Although a number of concerns were discussed and several resolved, the following sections highlight areas that, in the Commission's view, warrant further attention.

RATIONALE AND RECOMMENDATIONS

Uncertainty in estimating exclusion and buffer zones

The Commission continues to have concerns regarding the method used to estimate exclusion and buffer zones (based on Level A and B harassment, respectively) and the numbers of takes for USGS- and NSF-funded geophysical research. These concerns date back to 2010 (please refer to the Commission's 12 March, 19 April, and 24 June 2013 and 31 March 2014 letters for detailed rationale). Briefly, LDEO performs acoustic modeling for geophysical research conducted by the *Langseth*. 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). That 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. However, LDEO continues to believe that its model generally is conservative when compared to in-situ sound propagation measurements of the R/V *Maurice Ewing*'s arrays (i.e., 6-, 10-, 12-, and 20-airgun arrays) and the R/V *Langseth*'s 36-airgun array from the Gulf of Mexico (Tolstoy et al. 2004, Tolstoy et al. 2009, Diebold et al. 2010[1]). LDEO also has noted the model is most directly applicable to deep water (> 1,000 m). Diebold et al. (2010) noted the limited applicability of LDEO's model when sound propagation is dependent on water temperature, water depth, bathymetry, and bottom-loss parameters. They further indicated that modeling could be improved by including realistic sound speed profiles within the water column. In addition, Tolstoy et al. (2009) acknowledged that sound propagation depends on water depth, bathymetry, and tow depth of the array and that sound propagation varies with environmental conditions and should be measured at multiple locations.

LDEO has stated that the model for deep water overestimates the received sound levels at a given distance but is still valid for defining exclusion zones at various tow depths. However, LDEO indicated in Appendix A of the environmental assessment for the proposed survey that the calibration data show that at greater distances (4 to 5 km) sound reflected from the sea floor and refracted from the sub-seafloor dominate, 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 indicative of site-specific environmental conditions, including bathymetry and sound speed profiles. The reflective/refractive arrivals are the very measurements that should be accounted for in site-specific modeling and ultimately determine underwater sound propagation. Ignoring those factors is a serious flaw of LDEO's model. Furthermore, the estimated exclusion zones for the proposed survey (36-airgun array towed at 9 m in depth) are smaller[2] than previously authorized and the buffer zones are larger[3] than previously authorized (75 Fed. Reg. 44770; 76 Fed. Reg. 75525, 49737; 77 Fed. Reg. 25693, 41755). This is a bit perplexing as the Commission is unaware of any changes to LDEO's model[4]. All these shortcomings reinforce the Commission's ongoing concerns regarding the estimation of exclusion and buffer zones for USGS- and NSF-funded geophysical surveys.

Those concerns are based primarily on the failure to verify the use of LDEO's model under the specific environmental conditions that would be encountered with each survey. For that reason, the Commission has recommended that NMFS or the relevant entity estimate exclusion and buffer zones using either empirical measurements from the particular survey site or a model that accounts

[1] Diebold et al. (2010) also presented data on the 18-airgun array from the Gulf of Mexico.
[2] 286 vs. 400 m for the 190-dB re 1 μPa threshold and 927 vs. 940 m for the 180-dB re 1 μPa threshold.
[3] 5,780 vs. 3,850 m for the 160-dB re 1 μPa threshold.
[4] Appendix H of the PEIS has been used in support of LDEO's model since it was available for public review in 2010 and, to the Commission's knowledge, has been unchanged since that time. Those figures have included the maximum sound pressure level trajectories and have been based on sound exposure levels, with a presumed 10 dB difference for sound pressure levels.

for the conditions in the proposed survey area. The model should incorporate operational parameters (e.g., tow depth, source level, number/spacing of active airguns) and site-specific environmental parameters (e.g., sound speed profiles, refraction in the water column, bathymetry/water depth, sediment properties/bottom loss, and wind speed). 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[5] (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 derived estimates to model-estimated exclusion and buffer zones, but those results do not appear to have been published yet. The Commission is pleased to hear of this work but encourages LDEO 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 recommended in its 24 June 2013 letter that such comparisons be made prior to submitting 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 parameters (including sound speed profiles, bathymetry, and bottom characteristics) for all future applications that use LDEO's model. Neither approach was used for the proposed incidental harassment authorization.

NMFS has indicated that NSF, LDEO, and other relevant entities (USGS, Scripps Institution of Oceanography (Scripps)) are providing sufficient scientific justification for their take estimates. The Commission disagrees with this conclusion, given that the estimates are based on LDEO's model or empirical measurements in the Gulf of Mexico, while recent activities would occur in areas such as the North Atlantic and the Antarctic. Environmental conditions in waters off New Jersey (up to 1,500 m in depth) indicate a surface duct at 50 m, in-water refraction, and bathymetry and sediment characteristics that reflect sound in summer. Further, conditions near the mid-Atlantic ridge (up to 5,000 m in depth) indicate a pronounced sound channel at approximately 1,000 m depth and a downward-refracting stratified surface layer in summer, with nearly identical sound speed profiles in spring and fall[6]. Although a surface duct likely is present in the proposed survey area, none of the site-specific parameters are accounted for in LDEO's model[7].

In a recent sound exposure modeling workshop that was attended by numerous entities (including NMFS, NSF, LDEO, USGS, and the Commission), experts confirmed that sound speed profiles and bathymetry/sediment characteristics were the most important factors affecting

[5] Diebold et al. (2010) supported such an approach, stating that streamer data can provide an accurate assessment of sound exposure levels at the relevant ranges for mitigation in shallow-water environments (≤ 100 m). They further indicated it seems logical and advantageous that those data be monitored in real time to fine tune a priori mitigation zones in shallow-water environments.

[6] NSF and USGS's PEIS included environmental data from the continental shelf close to the proposed survey.

[7] NMFS has acknowledged that although the acoustic energy within the third and fourth lobes (330–667 Hz) of the impulsive waveform would be trapped in the surface duct and propagated to greater distances, those lobes represent only a fraction of the total acoustic energy (specifically for the LDEO New Jersey survey; 79 Fed. Reg. 38500). The Commission notes that the impulsive waveform includes sound energy in frequencies even greater than 667 Hz, including contributions from mid- and high-frequency sound that may be trapped in the surface duct and propagated further than sound below 330 Hz.

underwater sound propagation and should be included in related modeling. While LDEO presented various aspects of its model during the workshop and indicated that the model was fast, inexpensive, and simple to use, none of those attributes support its applicability or accuracy. Further, LDEO indicated that the model is more closely related to a source model that compares airgun arrays and that it is not representative of modeling in the actual environment. Therefore, the Commission remains concerned that the LDEO model is not based on best available science and does not support its continued use. For all of these reasons, the Commission recommends that NMFS (1) require USGS, LDEO, and NSF to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific parameters (including sound speed profiles, bathymetry, and sediment characteristics at a minimum) for the proposed incidental harassment authorization and (2) impose the same requirement for all future incidental harassment authorizations submitted by USGS, LDEO, NSF, Scripps, Antarctic Support Contract (ASC), or any other related entity.

In 2011[8], NSF and USGS modeled sound propagation under various environmental conditions in their PEIS. LDEO and NSF (in cooperation with Pacific Gas and Electric Company) also used a similar modeling approach in the recent incidental harassment authorization application and associated environmental assessment for a geophysical survey of Diablo Canyon in California (77 Fed. Reg. 58256). These recent examples indicate that LDEO, NSF, and related entities are able to implement the recommended modeling approach, if required to do so by NMFS. The Commission understands the constraints imposed by the current budgetary environment, but notes that other agencies that contend with similar funding constraints incorporate modeling based on site-specific parameters. USGS, LDEO, NSF, and related entities (ASC, Scripps) should be held to that same standard. NMFS recently indicated that it does not, and does not believe it is appropriate to, prescribe the use of any particular modeling package (79 Fed. Reg. 38499). The Commission agrees that NMFS should not instruct applicants to use specific contractors or modeling packages, but it should hold applicants to the same standard, primarily one in which site- and operation-specific environmental parameters are incorporated into the models.

NMFS further indicated that based on empirical data (which illustrate the LDEO model's conservative exposure estimates for the Gulf of Mexico and preliminarily off Washington), it found that LDEO's model effectively estimates sound exposures or number of takes and represents the best available information for NMFS to reach its determinations for the authorization. However, for the survey off New Jersey, NMFS increased the exclusion zone radii by a factor of 50 percent (equivalent to approximately a 3-dB difference in received level at the zone edge) to be additionally precautionary (79 Fed. Reg. 38499). The Commission must question, if NMFS really believes the LDEO model is based on best available science, why it then extended the exclusion zones to be precautionary and if NMFS felt the need to be precautionary and extend the exclusion zones, why it did not then also extend the buffer zones and thus the estimated numbers of takes of marine mammals.

Density estimates

In estimating the numbers of potential takes for the proposed incidental harassment authorization, USGS used density data from the Ocean Biogeographic Information System Spatial

[8] The record of decision was signed in 2012.

Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP), specifically data originating from Navy Operating Area Density Estimates (NODE). USGS considered those estimates to be the best available data. However, those data apply only to the U.S. EEZ, which comprises only 20 percent of the proposed survey area in 2014 and 10 percent in 2015. It is unclear if USGS assumed the densities in areas outside the U.S. EEZ to be 0, if it applied the densities estimated for waters within the EEZ to those other areas, or if it did some permutation of those two methods[9]. In any case, the densities could have been underestimated.

Although NMFS indicated in the *Federal Register* notice for the proposed authorization that the OBIS-SEAMAP data were determined to be the best available information for density data, the Commission understands that NMFS subsequently determined that the data from the Navy's Atlantic Fleet Training and Testing Navy Marine Species Density Database (AFTT NMSDD) are superior and are now considered the best available. Therefore, the Commission understands that NMFS intends to use the AFTT NMSDD data to re-estimate the numbers of marine mammals that could be taken during the proposed survey. The Commission agrees that the AFTT NMSDD data are preferable and should be used to re-estimate the numbers of takes for all marine mammal species and used for the analyses required under both the MMPA and the Endangered Species Act (the ESA). Furthermore, the Commission recommends that the same methods be used to determine the densities for the analyses conducted under the MMPA and ESA.

For some species, the estimated numbers of takes may increase if the AFTT NMSDD data are used. It remains unclear whether any such increases in those estimates would change NMFS's proposed findings as to whether only "small numbers" of marine mammals would be taken or whether such takes would have a "negligible impact" on the affected species and stocks. This is particularly true because NMFS has yet to develop a clear policy setting forth more explicit criteria and/or thresholds for making those determinations, as recommended by the Commission. Such guidance would be particularly useful in a case like this, in which up to 43 percent of the pantropical spotted dolphin stock in the area, or perhaps even more[10], could be taken incidentally during the proposed survey activities. The Commission notes that NMFS, in its proposed authorization, estimated that 6.54 percent of the pantropical spotted dolphin stock would be affected– however, that estimate is based only on the portions of the survey that will occur within the U.S. EEZ. As previously stated, most of the proposed survey would occur in waters outside the EEZ and should be accounted for in both the authorization and the supporting analyses. Is NMFS suggesting that the taking prohibition of the MMPA does not apply to takes by U.S. citizens on the high seas outside the U.S. EEZ or that an incidental take authorization somehow is not needed for activities engaged in by U.S. citizens in those waters? Clearly the taking prohibition applies (see section 102(a)(1)), and, as such, an authorization is needed[11]. Further, that authorization can be issued only if the overall

[9] USGS's application and environmental assessment indicated the model outputs of all four seasons from the NODE data were used to determine the mean density. However, in further correspondence, USGS indicated that areas beyond the U.S. EEZ were essentially classified as "no data", and median densities were calculated from only areas that had data within the EEZ. Curiously, if one obtains data from the OBIS-SEAMAP website and uses either of those two methods, the data in Table 4 of the *Federal Register* notice (and the relevant tables in the application and environmental assessment) are not reproducible and in some cases are underestimates of the OBIS-SEAMAP data.

[10] Based on the OBIS-SEAMAP data, those takes likely will increase when the takes are re-estimated using the AFTT NMSDD data.

[11] For previous incidental harassment authorizations for LDEO surveys conducted only in international waters of the North Atlantic, NMFS based its small numbers determination on the abundance of the regional population, most of

impact of the taking would be negligible and involve only small numbers of marine mammals. Accordingly, the Commission recommends that NMFS make its small numbers and negligible impact determinations based on the total numbers of marine mammals to be taken for the entire survey (including the combined 2014 and 2015 survey legs), both in the U.S. EEZ and in international waters. The Commission understands that NMFS is in the process of developing both a clearer policy to outline the criteria for determining what constitutes "small numbers" and an improved analytical framework for determining whether an activity will have a "negligible impact" for the purpose of authorizing takes of marine mammals and that NMFS plans to engage the Commission in that process at the appropriate time (79 Fed. Reg. 13626). As previously noted, clearer policies would be especially helpful for reviewing the proposed authorization, and the Commission encourages NMFS to complete its policy development as quickly as possible and awaits a meeting to engage in that policy process.

Under section 101(a)(5)(D)(iii) of the MMPA an incidental harassment authorization can be issued only after notice in the *Federal Register* and opportunity for public comment. However, that public review opportunity is meaningful only if the proposed authorization contains accurate information and the relevant analyses. If, subsequent to publication, substantive changes are made to the underlying information or NMFS's analyses, re-publication with a new comment opportunity is appropriate. In this instance, it appears that NMFS's published analyses were not based on the best available information and that it may have significantly underestimated the likely numbers of takes for at least some of the marine mammal species and stocks that occur in the proposed survey area. That being the case, the Commission recommends that NMFS publish a revised proposed authorization in the *Federal Register* with updated estimated numbers of takes and small numbers and negligible impact analyses to provide a more informed public comment opportunity. Further, the Commission recommends that, to the extent possible, NMFS strive to identify and incorporate any substantive changes that might be made in a proposed incidental harassment authorization prior to publication in the *Federal Register*.

Monitoring measures

In previous letters, the Commission has indicated that monitoring and reporting requirements should be sufficient to provide a reasonably accurate assessment of the manner of taking and the numbers of animals taken by the proposed activity, specifically to verify 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 animals at the surface but not detected and for animals present but underwater and not available for sighting, which are accounted for by g(0) and f(0) values. NMFS's most recent response to the Commission's comments indicated that the MMPA implementing regulations require that applicants include monitoring that will result in "an increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities . . ." 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 believes that NMFS misinterpreted its implementing regulations in its response. Those regulations state that applicants are to specify—

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which originated from NMFS's stock assessment reports (see Tables 2 in 78 Fed. Reg. 10142 and 78 Fed. Reg. 22249 for the Mid-Atlantic Ridge survey).

> The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities, and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity.

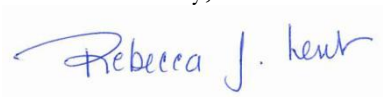
Although this portion of the regulations[12] is not particularly clear, it appears that the phrase "increased knowledge" is intended to modify the clause "of the species" and not "the level of taking or impacts on the populations of marine mammals that are expected to be present while conducting activities". If the phrase "increased knowledge of" is intended to apply throughout the remainder of the provision, as NMFS suggests, then the portion requiring the applicant to provide "suggested means of minimizing burdens…" makes no sense. A better interpretation of the provision is that the applicant is to suggest monitoring and reporting measures that will (1) increase the knowledge regarding the species and (2) provide the necessary information regarding the level of incidental taking that occurs 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. It is through the prescribed monitoring and reporting requirements that NMFS collects the information necessary to make those determinations. As such, those requirements need to be sufficient to provide 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. Accordingly, the Commission continues to believe 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 corrections should be based on the ability of the protected species observers to detect marine mammals rather than a hypothetical optimum derived from scientific studies (e.g., from NMFS's shipboard surveys).

Therefore, the Commission again recommends that NMFS consult with USGS, LDEO, NSF, and other relevant entities (e.g., Scripps, ASC) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal takes and the actual numbers of marine mammals taken by incorporating applicable g(0) and f(0) values. NMFS recently stated that although 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's monitoring plan, NMFS agreed 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 it would consult with the Commission and NMFS scientists prior to finalizing the recommendations (79 Fed. Reg. 38503). The Commission welcomes such a meeting.

[12] The Commission also questions whether the cited regulation is even the relevant one upon which NMFS should be relying. It merely specifies what applicants should be suggesting when applying for an incidental take authorization. NMFS has an independent responsibility under the MMPA to specify monitoring and reporting requirements that are sufficient for it determine that the statutory requirements are being met.

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

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