



# MARINE MAMMAL COMMISSION

8 December 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 Lamont-Doherty Earth Observatory (LDEO), in collaboration with 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 in the South Atlantic Ocean from January–March 2016. The Commission also has reviewed the National Marine Fisheries Service’s (NMFS) 1 December 2015 notice announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (80 Fed. Reg. 75356).

## Background

LDEO proposes to conduct a 2D geophysical survey off Brazil just west of the Mid-Atlantic Ridge in international waters. The purpose is to study the evolution of the South Atlantic Ocean crust on million-year timescales and the evolution and stability of low-spreading ridges over time. The survey would be conducted in waters estimated to be 1,150 to 4,800 m in depth along approximately 3,263 km of tracklines. LDEO would use the R/V *Marcus G. Langseth* to operate a 36-airgun array at a tow depth of 9 m. The *Langseth* also would (1) tow a hydrophone streamer (8,000 m in length) or (2) use seven ocean-bottom seismometers to collect data 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 during the survey. The survey is expected to last for 22 days.

NMFS preliminarily has determined that, at most, the proposed activities would result in the incidental taking of small numbers of up to 38 species of marine mammals by Level B harassment<sup>1</sup>

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<sup>1</sup> The Commission understands that NMFS included greater Level B harassment takes for blue whales, Bryde’s whales, humpback whales, and dwarf and pygmy sperm whales and fewer Level B harassment takes for southern elephant seals and Subantarctic fur seals in Table 5 than what was delineated in the *Federal Register* text. NMFS plans to amend the table based on the methods described in the text. NMFS also inadvertently used a density estimate approximately three times lower than it should have been for Atlantic spotted dolphins but plans to amend both the Level A and B harassment takes accordingly.

and 16 species of marine mammals by Level A harassment<sup>2</sup> 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) refraining from operating the multibeam echosounder and sub-bottom profiler in transit to and from the survey area, (2) monitoring the exclusion and buffer zones (based on Level A and B harassment, respectively), and (3) using power-down, shut-down, and ramp-up procedures. In addition, LDEO would power down the array, if possible, when concentrations of large 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. Further, LDEO would implement speed and course alterations if those alterations do not compromise operational safety.

### **Uncertainty in modeling exclusion and buffer zones**

For nearly six years, the Commission has raised concerns about 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. Recently, other entities<sup>3</sup> have expressed similar concerns regarding the appropriateness of those methods (80 Fed. Reg. 67713). LDEO performs acoustic modeling<sup>4</sup> for geophysical research funded by NSF<sup>5</sup> to estimate exclusion and buffer zones using a simple ray trace-based modeling approach that assumes spherical spreading, a constant sound speed, and no bottom interactions for surveys in deep water (Diebold et al. 2010). As noted in numerous Commission letters, multiple LDEO-affiliated studies<sup>6</sup> have emphasized the importance of incorporating site-specific environmental and operational parameters into estimating exclusion and buffer zones. The recent Crone et al. (2014)<sup>7</sup> study indicated that, in shallow and sloped environments, the complexity of local geology 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.

To estimate the proposed exclusion and buffer zones for the survey in the South Atlantic Ocean, LDEO used its model for the 36-airgun array and the mitigation airgun. The use of LDEO's simple model has yet to be substantiated relative to conditions beyond the Gulf of Mexico, let alone along the Mid-Atlantic Ridge in the South Atlantic Ocean where a prominent sound channel likely is present similar to conditions at the Mid-Atlantic Ridge in the North Atlantic Ocean. NMFS stated in the *Federal Register* notice that LDEO used a process to confirm the conservative nature of its radii for a shallow-water seismic survey, which was based on the empirical

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<sup>2</sup> The Commission understands that NMFS proposed to authorize taking by Level A harassment to account for situations in which marine mammals may enter the Level A harassment zone before the airguns can be either powered or shut down, namely because standard mitigation measures included in incidental take authorizations rely on visual monitoring and implementation may not occur until an animal is observed within the specified zone.

<sup>3</sup> Natural Resources Defense Council and Whale and Dolphin Conservation.

<sup>4</sup> LDEO applies a correction factor of 1.5 to the deep-water radii for surveys in intermediate water and scales empirically-derived measurements from the calibration study in the Gulf of Mexico for surveys in shallow water.

<sup>5</sup> Including NSF's Division of Polar Programs and Antarctic Support Contract (ASC) and projects funded by the U.S. Geological Survey (USGS).

<sup>6</sup> Tolstoy et al. (2004), Tolstoy et al. (2009), Diebold et al. (2010), and most recently, Crone et al. (2014).

<sup>7</sup> Crone et al. (2014) used hydrophone data from waters off Washington State to compare empirically derived to predicted exclusion and buffer zones for LDEO's 36-airgun array towed at 9 m with a total volume of 6,600 in<sup>3</sup>. Data were used only for water depths of up to 200 m.

measurements LDEO routinely uses from the Gulf of Mexico survey<sup>8</sup> likely overestimating the size of the empirically-derived exclusion and buffer zones from Crone et al. (2014). NMFS indicated it had reviewed that preliminary information in consideration of how those data reflect on the accuracy of LDEO's current modeling approach. The Commission questions the reliance on those data since the proposed survey neither occurs in shallow water nor uses empirical measurements from the Gulf of Mexico as a proxy—rather the proposed survey would occur in deep water and relies on LDEO's model to estimate the exclusion and buffer zones. The findings in Crone et al. (2014), and Crone (2015), are irrelevant when estimating those zones in deep water.

With regards to shallower water environments, LDEO has used numerous models<sup>9</sup> to fit the empirical data off Washington and New Jersey. Extrapolation also was necessary for the various thresholds due to the radii being either beyond the range of the hydrophone streamer or closer to the ship than what the streamer could collect. These recent examples highlight the inherent site-specific and near- and far-field differences in deriving both exclusion and buffer zones. And, although LDEO's model and other methodologies do not incorporate environmental characteristics of the specific South Atlantic survey area<sup>10</sup>, the most widely accepted modeling approaches that currently are used, and historically have been used, by other action proponents conducting seismic surveys do incorporate those characteristics. Those action proponents also generally collect empirical sound source and sound propagation measurements to verify their modeled outputs. The inappropriate use of exclusion or buffer zones derived from measurements in one specific ocean basin as proxies for other environments and simple spherical spreading models or numerous correction and scaling factors is unique to LDEO. If such simple models, extrapolations, and scaling factors were considered best available science and more representative of actual conditions, it would be expected that other action proponents would use those methods rather than allocating funds, as they do, to more sophisticated modeling. Despite the Commission's repeated comments on this issue, NSF continues to base its own modeling approaches on methods that are significantly outdated and NMFS continues to consider them to be best available science. The Commission again underscores that LDEO, NSF, and related entities (ASC, USGS, Scripps Institution of Oceanography (Scripps)) should be held to the same standard as other action proponents (i.e., Bureau of Ocean Energy Management, the oil and gas industry, U.S. Navy, U.S. Air Force).

Because empirical measurements are lacking for the South Atlantic Ocean and LDEO has failed to verify the applicability of its exclusion and buffer zones to conditions in the South Atlantic, the Commission believes that LDEO should estimate those zones using a model that accounts for the conditions in the proposed survey area. The model should incorporate both site-specific environmental<sup>11</sup> and operational<sup>12</sup> parameters. Until such models are used, the Commission believes LDEO's use of a simplistic model, various extrapolations, and correction and scaling factors is not

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<sup>8</sup> That were scaled to the appropriate tow depth and corrected for intermediate water depths.

<sup>9</sup> A non-parametric smoothing cubic spline model, spherical spreading model with an attenuation term, and high-degree polynomial model were used in Crone et al. (2014) and a simple logarithmic spreading loss model (the spreading loss factor/fitting parameters were not specified) was used in Crone (2015).

<sup>10</sup> Including sound speed profiles and refraction within the water column, bathymetry/water depth, sediment properties/bottom loss, or absorption coefficients.

<sup>11</sup> Such as sound speed profiles, refraction in the water column, bathymetry/water depth, sediment properties/bottom loss, and wind speed.

<sup>12</sup> Such as tow depth, source level, number/spacing of active airguns.

best available science. Therefore, the Commission recommends that NMFS (1) require LDEO to 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 LDEO, NSF, ASC, USGS, Scripps, or any other relevant entity.

### **Monitoring measures**

For a number of years, the Commission has indicated that the monitoring and reporting requirements adopted 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. The Commission continues to believe those assessments should account for all animals in the survey 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<sup>13</sup>. In the past, NMFS has indicated that those assessments could be qualitative or relative in nature, or they could be more directly quantitative (80 Fed. Reg. 67716). However, the Commission is unsure how a qualitative assessment could provide information regarding the numbers of marine mammals taken and whether those are considered small numbers. For well over a year, NMFS has indicated that developing and incorporating a way to better interpret the results of LDEO's monitoring results (perhaps a simplified or generalized version of  $g(0)$  and  $f(0)$  that the Commission has been recommending for a number of years) is desirable and that it is continuing to examine the issue with NSF to develop ways to improve LDEO's post-survey take estimates. NMFS has indicated it would continue to consult with the Commission and NMFS scientists prior to finalizing any future recommendations, but discussions regarding this matter have yet to occur.

LDEO's current method, which assumes that the number of animals detected during the survey equates to the total numbers taken, results in an underestimate, given that marine mammals spend the majority of their time underwater and therefore are undetectable. To address this ongoing shortcoming, the Commission again recommends that NMFS consult with LDEO and other relevant entities (e.g., NSF, ASC, 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 appropriate estimates of  $g(0)$  and  $f(0)$  values derived from protected species observer data collected during geophysical surveys.

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<sup>13</sup> These values vary based on platform characteristics, observer skill, environmental conditions, and sightability and detectability of the species.

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

Sincerely,



Rebecca J. Lent, Ph.D.  
Executive Director

## References

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