1 May 2019

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)[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 incidental to conducting a marine geophysical survey in the Gulf of Alaska in summer 2019. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 9 April 2019 notice[2] announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (84 Fed. Reg. 14200).

Background

LDEO proposes to conduct a geophysical survey in western Gulf of Alaska within waters of the U.S. exclusive economic zone. The purpose of the survey is to investigate the architecture of the Alaska Peninsula subduction zone and understand the structures that control how and where the planet's largest earthquakes occur. The survey would be conducted along approximately 4,400 km of tracklines in waters estimated to be 15 m to more than 6,100 m in depth. LDEO uses the R/V *Marcus G. Langseth* (*Langseth*) to operate a 36-airgun array with a maximum discharge volume of 6,600 in^3 at a tow depth of 12 m. In addition, the *Langseth* would (1) tow a 4-km hydrophone streamer and (2) operate a 12-kHz multibeam echosounder, 3.5-kHz subbottom profiler, and acoustic Doppler current profiler continuously during the surveys[3]. Collaborators have already

[1] And funded by the National Science Foundation (NSF).
[2] The Commission noted multiple errors, inconsistencies, and omissions in the preamble and proposed authorization. NMFS indicated it would fix those issues for the final authorizations. As one example, the *Federal Register* notice indicated that the *Langseth* would leave from and return to port in Kodiak, likely during late spring (end of May/early June) 2019 and that tentative sail dates were 1–19 June 2019. When the Commission informally noted that the dates do not match, NMFS indicated that LDEO wanted to retain flexibility. Thus, it is still unclear whether the ship would leave port in May or June, but this should have been determined long before the proposed authorization was submitted to the *Federal Register* for public comment.
[3] These devices would not be used during transits.

deployed 75 ocean bottom seismometers (OBSs)[4] and 400-450 terrestrial seismometers[5] to be used during the surveys. The survey could occur on up to 18 days.

NMFS preliminarily has determined that the proposed activities could cause Level A[6] and/or B harassment of small numbers of numerous species or stocks 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 has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks. Those measures include (1) using protected species observers to monitor the Level A and B harassment zones for 30 minutes before, during, and for 60 minutes after the surveys, (2) implementing speed and course alterations, and (3) using power-down, shut-down[7], and ramp-up procedures[8]. In addition, LDEO would shut down the airguns immediately if (1) a North Pacific right whale, (2) a large whale[9] with a calf, or (3) an aggregation[10] of large whales is observed regardless of the distance from the *Langseth*. Ramp-up procedures would not be initiated until the animal(s) has not been seen at any distance for 30 minutes. Further, LDEO would shut down the guns immediately if a fin whale or group of fin whales is observed within 1.5 km of the array in the fin whale biologically important area designated for feeding[11] and would remain at least 5.6 km from Steller sea lion rookeries and haul-out sites. LDEO would report any injured or dead marine mammal to NMFS's Office of Protected Resources and the Alaska Regional Stranding Coordinator using its phased approach.

Although NMFS indicated in the preamble that LDEO planned to conduct outreach to subsistence users, it is unclear whether Native Alaskan communities or entities were contacted and whether any of the communities or entities had specific concerns regarding the proposed survey. It further is unclear why the communities and entities were not contacted well in advance of the proposed survey[12], as LDEO submitted its application in November 2018. As such, the

[4] The survey needs to be conducted while the OBSs are on the seafloor and prior to their retrieval on 6 August.
[5] The most value-added time window to conduct the survey is from mid-May until mid-June when the terrestrial seismometers are deployed on Kodiak Island.
[6] The Commission informally noted errors in the estimated numbers of Level A harassment takes based on calculation errors, incorrectly increasing the takes for mid-frequency cetaceans, and failing to increase the takes to average group size for low-frequency cetaceans. Thus, the Level A harassment takes would increase for nearly all species except mid-frequency cetaceans, which would be reduced to zero. NMFS plans to fix all these issues in the final authorization.
[7] Shut downs would not be required for small delphinids (*Delphinus* spp.*, Tursiops* spp.*, Stenella* spp., *Steno* spp., *Lagenodelphis* spp., *Lissodelphis* spp., and *Lagenorhynchus* spp.) that are traveling and voluntarily approaching the source vessel to interact with the vessel and/or airgun array. Power and shut downs would be required if observers are able to localize a marine mammal acoustically within the exclusion zone.
[8] The Commission informally noted that NMFS omitted the standard mitigation measure to implement a shut down if a species for which authorization was granted but the takes have been met or a species for which authorization has not been granted approaches the Level A or B harassment zones. NMFS indicated it would include this measure in the final authorization.
[9] A sperm whale or mysticete. The Commission informally noted that this information was omitted in the preamble and in the proposed authorization. NMFS indicated it would be included in the final authorization.
[10] Six or more individuals that do not appear to be traveling and are feeding, socializing, etc. The Commission informally noted that this information was omitted in the preamble and in the proposed authorization. NMFS indicated it would be included in the final authorization.
[11] Defined by Ferguson et al. (2015) as the waters around the Semidi Islands, Kodiak Island, and Chirikof Island.
[12] NSF reached out to the Commission regarding relevant contacts in March 2019, which the Commission provided the same day. It is unclear why information is still unavailable regarding whether communities and entities were contacted.

Commission recommends that NMFS refrain from issuing the incidental harassment authorization until LDEO has contacted Native Alaskan communities and entities, any concerns are conveyed, and any additional measures are required to be implemented to mitigate any potential conflicts with subsistence hunting.

Uncertainty in density estimates

Uncertainty in general—LDEO used various datasets to inform its density estimates (see Table 6 in the *Federal Register* notice), including many that have been used by the U.S. Navy (the Navy) for the Gulf of Alaska (Department of the Navy 2014). Some of the densities were based on Rone et al. (2014) and, in some instances, include coefficients of variation that are quite large. For example, the densities for killer whales were 0.005 (CV=0.60) for the inshore stratum, 0.002 (CV=0.77) for the offshore stratum, 0.002 (CV=0.77) for the seamount stratum, and 0.020 (CV=1.93) for the slope stratum. Using only the mean densities would likely result in an underestimation of takes due to the CVs being so much greater than the mean point estimates. The abundance estimates for unidentified large whales also were prorated among blue, fin, and humpback whales within each stratum and incorporated proportionally into each species' density estimate. A high level of uncertainty and variability is inherent in using such prorated methods. In addition, Rone et al. (2014) did not correct the density (or abundance) estimates for the proportion of animals missed on the transect line (g(0)), which results in an underestimation of densities. Further, some density estimates were based on data from Waite (2003) that included (1) a single sighting and/or (2) f(0) and g(0) values derived from other surveys in the North Pacific[13].

The Commission understands that density data are not available for all areas where, or times when, activities may occur and that even when such data are available the densities could be underestimated if associated CVs are large. However, the Commission continues to believe that action proponents should use the best available density estimate plus some measure of uncertainty (e.g., mean plus two standard deviations, mean plus the CV, the upper limit of the confidence interval) in those instances. NMFS indicated that LDEO's routinely assumed 25-percent contingency accounts for both the possibility of additional seismic operations associated with airgun testing and repeat coverage of any areas where initial data quality is sub-standard *and* in recognition of the uncertainties in the density estimates. The latter rationale is disingenuous given that LDEO has included a 25-percent contingency based solely on conducting additional seismic activities for a decade or more and just added the uncertainty in density estimates in recent years.

The Commission has repeatedly recommended that NMFS should have a policy or provide other guidance that sets forth a consistent approach for how applicants should incorporate uncertainty in density estimates—an issue that is particularly problematic and persistent for both geophysical surveys and military activities[14]. Until such time that NMFS develops a policy and since many of the references from which the density data originated include CVs, the Commission recommends that NMFS adjust the density estimates using either CVs or standard deviations for the Gulf of Alaska survey area.

[13] Waite (2003) did not provide survey-specific f(0) and g(0) values; therefore, those values originated from other surveys that occurred in the North Pacific.
[14] Especially for pinnipeds when a simple abundance divided by area method is used.

In 2013, NMFS indicated that it was 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). To move toward resolution of this issue since it has not yet been resolved, the Commission recommends that NMFS convene a working group of scientists (including those from NMFS's science centers and academia) to determine how best to incorporate uncertainty in density data[15] in the near term. The Navy has funded the University of St. Andrews and other collaborators to investigate various aspects of density surface modeling through its DenMod working group. Unfortunately, products from the DenMod working group will not be available until December 2021 at the earliest, and this issue needs to be resolved before that time.

Steller sea lion densities—To estimate Steller sea lion densities, LDEO used data from Department of the Navy (2014), which relied on abundance estimates from stock assessment reports that had been divided by an area[16]. The Navy cited Angliss and Allen (2009) for the combined Steller sea lion abundance estimate. Not only have those abundance estimates increased since the 2008 stock assessment report, but the Commission has commented on the inappropriateness of the Navy's pinniped densities and suggested that it use telemetry data to better refine its estimates. Department of the Navy (2019) did incorporate such a method for areas in southeast Alaska and off the Pacific northwest coast. Those revised density estimates are orders of magnitude greater than those used previously[17] and than those proposed for use in LDEO's authorization. The Commission also notes that the density estimates from Department of the Navy (2019) did not originate from areas within critical habitat or adjacent to known rookeries[18] where densities would be even greater. NMFS indicated that it would use the uncorrected density estimate[19] of 0.0392 sea lions/km^2 and revise the Level A and B harassment takes accordingly. The Commission believes that that density estimate is still too low.

Steller sea lion densities from Department of the Navy (2019) are relevant out to the 200-m isobath, and LDEO's inshore activities would occur out to the 1,000-m isobaths. Thus, the argument could be made that those densities could be an overestimate for LDEO's inshore strata. However, the average of the densities from all offshore strata in summer[20] would still be three times greater than what NMFS indicated it planned to use and would encompass waters deeper than the 1,000-m isobath[21]. Given that the Steller sea lion densities in southeast Alaska and the Pacific northwest are comparable and much greater than the uncorrected density estimate from Department of the Navy (2014) used by LDEO, and LDEO's activities would occur in Steller sea lion critical habitat during the breeding season, the Commission recommends that NMFS at a

[15] Beyond those methods that can be used for extrapolating data from neighboring regions and are analytically intensive, such as Mannocci et al. (2017).
[16] That area was the Navy's Temporary Maritime Activities Area in the Gulf of Alaska scaled based on the area of the Gulf of Alaska's Large Marine Ecosystem.
[17] Densities in Western Behm Canal in southeast Alaska increased from 0.098—which is the same density used for LDEO's proposed authorization—to 0.316 sea lions/km^2 and from 0.0145 to 0.3554 sea lions/km^2 offshore of the Pacific northwest coast.
[18] Which is the case for LDEO's proposed activities.
[19] The original density estimate assumed that only 25 percent of the animals would be at sea at a given time, which is much less than 76 percent that is used by Department of the Navy (2019).
[20] Densities in areas off California, Oregon, and Washington in both the < 200-m isobath strata and the 200-m isobath to 300 km offshore strata would yield an average density of 0.120 sea lions/km^2.
[21] The inshore area extends to the 1,000-m isobath.

minimum use the average of the Steller sea lion densities during summer from the six offshore strata[22] based on Table 10-7 in Department of the Navy (2019) and revise the numbers of Level A and B harassment takes accordingly.

Flaws in modeling methodologies

The Commission has raised concerns regarding LDEO's model to estimate the extent of the Level A and B harassment zones and the numbers of marine mammal takes and has provided extensive comments regarding the inappropriateness of that model[23] for nearly 9 years. In more recent years, other stakeholders[24] have expressed similar concerns regarding the inappropriateness of those methods (80 Fed. Reg. 67713). LDEO uses the Nucleus source model and a simple ray trace–based modeling approach[25] that assumes spherical spreading, a constant sound speed, and no bottom interactions for surveys in deep water (Diebold et al. 2010). The Commission notes that LDEO's model provides results only for deep water (>1,000 m) and only up to a depth of 2,000 m—the current survey occurs in waters more than 6,100 m in depth. For intermediate water depths (100 to 1,000 m), LDEO applied a correction factor of 1.5 to the deep-water results. And, for shallow water depths, LDEO used in-situ measurements obtained in the Gulf of Mexico at a tow depth of 6 m scaled based on the proposed 12-m tow depth. Environmental conditions, including the presence of a surface duct[26], in-water refraction, and bathymetry and sediment characteristics were not accounted for in LDEO's modeling approach. Many studies, including multiple LDEO-associated studies,[27] have emphasized the importance of incorporating site-specific environmental and operational parameters into estimating Level A and B harassment zones. LDEO's simple model and crude assumptions, that could very well result in underestimated harassment zones in deep water and overestimated harassment zones in intermediate and shallow water, are not considered best available science.

These issues have been further complicated with the finalization in 2016 of NMFS's updated acoustic thresholds for permanent threshold shift (i.e., Level A harassment). LDEO continues to claim that its model cannot incorporate more than a single shot and thus cannot readily estimate ranges to the cumulative sound exposure level (SEL_{cum}) thresholds. In the absence of such a model, LDEO used NMFS's user spreadsheet to estimate the Level A harassment zones for the various functional hearing groups.

To estimate the Level A harassment zones, LDEO computed 'modified' frequency-weighted, farfield source levels. LDEO noted that those are more appropriate than the 'actual' farfield source levels[28] because an 'actual' farfield source level "does not take into account the

[22] If the Western Behm Canal density were to be added, the average of the seven densities would be 0.148 sea lions/km^2.
[23] Which should be reviewed in conjunction with this letter (see the Commission's 2 May 2016 letter) and are not reiterated herein.
[24] Natural Resources Defense Council and Whale and Dolphin Conservation.
[25] Essentially a MATLAB algorithm.
[26] NSF's programmatic environmental impact statement from 2011 noted that the summer sound speed profile in the western Gulf of Alaska has a strong sound channel at 70 m depth. That shallow sound channel is expected to trap much of the acoustic energy from an airgun array at the surface, resulting in ducted propagation and lower transmission loss at this site.
[27] Tolstoy et al. (2004), Tolstoy et al. (2009), Diebold et al. (2010), and Crone et al. (2014).
[28] Deemed a 'theoretical representation of the source level' or a 'theoretical far-field signature' in the application.

interactions of the two airguns that occur near the source center and is calculated as a point source (single airgun)"[29]. The modified farfield source levels[30] are essentially back-calculated source levels[31] based on the relevant frequency-weighted threshold. The Commission is unaware of any other seismic operators using such a circuitous approach to estimate harassment zones. Generally, source levels are inputs to models rather than products of those models, and the sound field from spatially-distributed sources (e.g., airgun arrays) is modeled as sums of point sources, under the assumption that individual airgun pressures do not substantially influence each other. Such an approach is straightforward, easy to implement, and accounts for both the 'near-field' and 'far-field' effects.

LDEO's method did incorporate the spectral aspects of the 36-airgun array to better refine the frequency-specific weighting function adjustments for the SEL_{cum} thresholds rather than using NMFS's simple weighting factor adjustment (i.e., 1 kHz for seismic). The Commission supports incorporation of spectral data but maintains that the spectral levels should not be cut off at 2.5 to 3 kHz, since airguns emit energy above 3 kHz. The frequency limits of Nucleus would affect the estimated ranges to the Level A harassment thresholds for various species (including mid-frequency (MF) and high-frequency (HF[32]) cetaceans). Other source models (including Gundalf Optimizer[33] and JASCO's Airgun Array Source Model (AASM)) can provide sound levels into the HF range and could have been used[34].

The use of truncated spectra and modified farfield source levels further supports the Commission's continued recommendation that NMFS require LDEO and other affiliated entities[35], to revise their source and sound propagation modeling methodologies. The Commission again underscores the need for NMFS to hold LDEO, NSF, and affiliated entities to the same standard as other action proponents (e.g., Bureau of Ocean Energy Management, the oil and gas industry, U.S. Navy, U.S. Air Force), as LDEO's model does not represent the best available science. Thus, the Commission again recommends that NMFS require LDEO to re-estimate the proposed Level A and B harassment zones and associated takes of marine mammals using (1) both operational (including number/type/spacing of airguns, tow depth, source level/operating pressure, operational volume) and site-specific environmental (including sound speed profiles, bathymetry, and sediment characteristics[36] at a minimum) parameters, (2) a comprehensive source model (i.e., Gundalf Optimizer) and (3) an appropriate sound propagation model for the proposed incidental harassment authorization. Specifically, the Commission reiterates that LDEO should be using the

[29] Where the effects of the array are the greatest and coherent summation does not occur.
[30] Although LDEO did not present both the modified and actual source levels in its application, the University of Hawaii (UH) presented those data in its recent application. UH's source levels were similar for some functional hearing groups but the modified source levels varied from the actual source levels by approximately 3 to 18 dB for other functional hearing groups.
[31] Assuming spherical propagation loss.
[32] Particularly since the Level A harassment threshold is 155 dB re 1 μ Pa^2-sec.
[33] https://www.gundalf.com/environmental/
[34] Alternatively, LDEO could use scenario C or D for extending the spectra to 10 kHz as described in its response to Commission's concerns (83 Fed. Reg. 44581), where it noted that those scenarios increased the isopleths by up to 20 m. Given that the extent of the Level A harassment zone for MF is 13.6 m, it is unclear whether that zone has been underestimated.
[35] Including U.S. Geological Survey (USGS) and Scripps Institution of Oceanography (Scripps).
[36] Those data can be obtained from the National Geophysical Data Center, Leviticus, and the U.S. Navy Oceanographic and Atmospheric Master Library's databases including Generalized Digital Environmental Model, Digital Bathymetric Database Variable-Resolution, Surface Marine Gridded Climatology.

ray-tracing sound propagation model BELLHOP—which is a free, standard propagation code that readily incorporates all environmental inputs listed herein, rather than the limited, in-house MATLAB code currently in use.

Furthermore, LDEO will be using a hydrophone streamer that would transfer the acoustic data to an on-board processing system and, more importantly, up to 75 OBSs that would receive and store additional acoustic data for analysis. Both of those could be used to determine whether the extents of the Level A and B harassment zones are accurate.[37] NMFS has been including in numerous authorizations the requirement that sound source verification studies (SSVs) be conducted for a myriad of activities, including seismic surveys, high-resolution geophysical surveys, confined underwater blasting, and various construction-related activities. SSVs have been required when action proponents use proxy source levels, as well as proxy sound propagation assumptions. Given the shortcomings noted for LDEO's source and sound propagation modeling and the requirements that other action proponents are obliged to fulfill, the Commission recommends that NMFS require LDEO to archive, analyze, and compare the in-situ data collected by the hydrophone streamer and OBSs to LDEO's modeling results for the extents of the Level A and B harassment zones based on the various water depths to be surveyed and provide the data and results to NMFS. This is particularly timely for this survey that occurs in very shallow, intermediate, and very deep water depths and occurs in colder waters where surface ducting is more likely to be present.

In response to this same recommendation regarding a 2018 geophysical survey, LDEO indicated that it had met with the Commission and NMFS on several occasions to discuss its model and explain that, while the model may be conservative[38], it is the most appropriate. The Commission's only meeting with LDEO was more than six years ago. That meeting and more than 35 letters on this matter have yet to sway NSF to follow methods that are widely agreed to be the best available science. LDEO's modeling approach has not changed in the last 10 to 15 years and the refusal to change would appear to contradict NSF's mission to *advance the progress of science*.

Mitigation measures

NMFS proposed to include numerous mitigation measures largely consistent with the incidental harassment authorizations issued in 2018 for geophysical and geological activities[39] in the Atlantic Ocean (83 Fed. Reg. 63268). The Commission is encouraged that NMFS is striving for consistency regarding mitigation measures for the same type of activities (i.e., geophysical or seismic surveys) but questions why some other measures were not included.

Specifically, NMFS did not propose to prohibit the use of power downs or the mitigation airgun. NMFS stated that, in a mitigation and monitoring workshop for seismic surveys, industry representatives indicated that power downs may ultimately increase sound input to the marine environment due to the need to subsequently re-shoot the trackline to prevent gaps in data acquisition (unpublished workshop report, 2012; 82 Fed. 26255). For that reason and because a power down may not actually be useful, NMFS has prohibited the use of power-downs in its

[37] Lack of accuracy includes both underestimates and vast overestimates.
[38] And in some instances, it may not be.
[39] Using similar-sized airgun arrays.

issuance of incidental harassment authorizations for taking of marine mammals associated with geophysical surveys in the Atlantic Ocean (83 Fed. Reg. 63350). Similarly, NMFS stated that there was no information to suggest that the mitigation airgun is an effective protective strategy, while it was certain that use of that technique would involve input of extraneous sound energy into the marine environment, including when use of the mitigation airgun is limited to some maximum time period (82 Fed. 26255). For those reasons, NMFS required that the acoustic source be deactivated when not acquiring or preparing to acquire data, except as necessary for testing, and that unnecessary use of the acoustic source be avoided (83 Fed. Reg. 63351). The Commission agrees with NMFS on both of those restrictions. Given that the efficacy of the measures has not changed and the energy emitted would not be substantially reduced, the Commission recommends that NMFS use a consistent approach for requiring *all* geophysical and seismic survey operators to abide by the same general mitigation measures, including prohibiting LDEO from using power downs and the mitigation airgun during its geophysical surveys.

Monitoring measures

The Commission maintains 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. Those assessments should account for all animals in the various survey areas, 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 is achieved by incorporating g(0) and f(0) values[40]. In response to the Commission's 8 December 2015 letter regarding an LDEO survey off Brazil, NMFS indicated that it agreed with the Commission's recommendation to improve the post-survey reporting requirements by accounting for takes using applicable g(0) and f(0) values (81 Fed. Reg. 2177). A few months thereafter, NMFS requested that the Commission develop a method to improve LDEO's post-survey reporting requirements—the Commission provided NMFS with that method in 2016 (see the Addendum herein).

Although NMFS has yet to implement that approach for the type of surveys for which it had requested the approach be developed, it is clear that NMFS believes that the Commission's method is appropriate. NMFS has agreed to use the Commission's method to better estimate the numbers of marine mammals taken by Level A and B harassment during geophysical activities in the Atlantic Ocean (83 Fed. Reg. 63361) and proposed to use the same approach for geophysical activities in the Gulf of Mexico (83 Fed. Reg. 29287 NMFS has provided no credible justification for why it refuses to require LDEO to use the method, or implement the method itself[41]. NMFS's reluctance to use the Commission's method for surveys conducted by LDEO and other NSF-affiliated entities, while using it for other geophysical surveys, appears arbitrary.

Additionally, the Commission continues to maintain that LDEO and other NSF-affiliated entities should pool the sightings data from their monitoring reports across all surveys and derive

[40] These values vary based on, among other things, platform characteristics, observer skill, environmental conditions, and sightability and detectability of the species.
[41] Similar to geophysical surveys in the Atlantic Ocean.

f(0) values specific to geophysical surveys[42] for the various species or genera (i.e., *Kogia* spp., *Mesoplodon* spp., *Delphinus* spp., etc.). The Commission's recommended method of using published data does not absolve action proponents from fulfilling this analytical need, which has been recommended and discussed between the agencies for *many* years. Therefore, until such time that a better method is developed or LDEO and other NSF-affiliated entities derive geophysical survey-specific *f*(0) values, the Commission recommends that NMFS require LDEO to use the Commission's method as described in the Addendum to better estimate the numbers of marine mammals taken by Level A and B harassment for the incidental harassment authorization. All other NSF-affiliated entities[43] and all seismic operators should use the Commission's method as well.

Proposed one-year authorization renewals

NMFS has indicated that it may issue a second one-year[44] incidental harassment authorization renewal for this and other future authorizations if various criteria are met and after an expedited public comment period of 15 days (see 84 Fed. Reg. 14240 for details). The Commission is unsure why, in this instance, NMFS would include such an option since LDEO's survey is contingent on the OBSs[45] being in the water and on the *Langseth*'s schedule and NSF's funded research—studies that are planned well in advance and generally are not postponed. Further, the Commission is concerned that the renewal process proposed in the *Federal Register* notice is inconsistent with the statutory requirements—section 101(a)(5)(D)(iii) clearly states that proposed authorizations are subject to a 30-day comment period— and Congressional expectations regarding the length of the comment period when it passed that provision[46].

Another potentially significant issue with the proposed 15-day comment period is the burden that it places on reviewers, who will need to review the original authorization and supporting documentation[47], the draft monitoring report(s), the renewal application or request[48], and the proposed authorization and then formulate comments very quickly. Depending on how frequently NMFS invokes the renewal option, how much the proposed renewal or the information on which it is based deviates from the original authorization, and how complicated the activities and the taking authorization is, those who try to comment on all proposed authorizations and renewals, such as the Commission, would be hard pressed to do so within the proposed 15-day

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[42] *g*(0) values from the literature would still need to be used. LGL (2008) indicated that the *f*(0) values that were used for that monitoring report were taken from results of previous work, not from observations made during that particular survey. It further stated that sighting rates during the present survey were either too small or, at most, marginal to provide meaningful data on *f*(0) based on group size. This implies that LDEO and other NSF-affiliated entities either have incorporated or could incorporate *f*(0) values specific to geophysical surveys.

[43] Including USGS, Scripps, etc.

[44] NMFS informed the Commission that the renewal would be issued as a one-time opportunity, after which time a new authorization application would be required. NMFS has yet to specify this in any *Federal Register* notice detailing the new proposed renewal process but should do so.

[45] Which will be retrieved in August 2019.

[46] See, for example, the legislative history of section 101(a)(5)(D), which states "…in some instances, a request will be made for an authorization identical to one issued the previous year. In such circumstances, the Committee expects the Secretary to act expeditiously in complying with the notice and comment requirements." (H.R. Rep. No. 439, 103d Cong., 2d Sess. 29 (1994)). The referenced "notice and comment requirements" specify a 30-day comment period.

[47] Including the original application, hydroacoustic and marine mammal monitoring plans, take estimation spreadsheets, etc.

[48] Including any proposed changes or any new information.

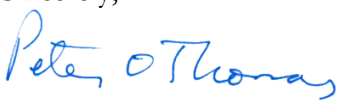
comment period. Therefore, the Commission recommends that NMFS refrain from using the proposed renewal process for LDEO's authorization. The renewal process should be used sparingly and selectively, by limiting its use only to those proposed incidental harassment authorizations that are expected to have the lowest levels of impacts to marine mammals and that require the least complex analyses. Notices for other types of activities, such as the LDEO's proposed geophysical surveys, should not include the possibility that a renewal might be issued using the proposed foreshortened 15-day comment period. If NMFS intends to use the renewal process frequently *or* for authorizations that require a more complex review (such as LDEO's authorization) or for which much new information has been generated (e.g., multiple or extensive monitoring reports), the Commission recommends that NMFS provide the Commission and other reviewers the full 30-day comment opportunity set forth in section 101(a)(5)(D)(iii) of the MMPA.

Completeness and accuracy

The Commission has repeatedly expressed concern over errors, inconsistencies, and omission's in applications and *Federal Register* notices involving LDEO and other NSF-funded and -affiliated surveys. Many of those issues affect the numbers of Level A and B harassment takes to be authorized and mitigation and monitoring measures to be required. The Commission contends that NMFS should not be processing applications that include incomplete information or inaccuracies. The Commission and the public rely on the accuracy of the applications, and the proposed authorizations developed from them by NMFS, in formulating comments and recommendations. Failure to identify incomplete information and inaccuracies undermines the adequacy and meaningfulness of the public review process. Therefore, the Commission again recommends that NMFS more thoroughly review applications and *Federal Register* notices prior to submitting them to the *Federal Register* for public comment.

Please contact me if you have questions concerning the Commission's recommendations.

Sincerely,



Peter O. Thomas, Ph.D.,
Executive Director

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ADDENDUM

The Commission's recommended method for estimating the number of cetaceans in the vicinity of geophysical surveys based on the number of groups detected

For each geophysical survey, observers collect the number of sightings observed, group size, distance and angle to sighting, distance travelled on survey effort, Beaufort sea state (BSS), wind speed, swell height, etc. A simple method to estimate the total number of cetaceans potentially taken by Level B harassment[49] can therefore be used. This method incorporates $f(0)$ and BSS-specific $g(0)$ values from Barlow (2015) [50] that were derived using Distance sampling methods (Buckland et al. 2001, 2004) and sightings data from each geophysical survey. The number of animals detected by an observer on a ship is an underestimate of the true number of animals in the vicinity of the ship because the observer inevitably misses some groups. If we know that we have detected n objects, and the probability of detecting each object is p, a standard way to estimate the total number of objects is n/p. We know n for each species from the data collected on each survey, so the problem is to find p for each species. Normally p is estimated from the data collected on each survey as part of a line-transect analysis. The probability p for each species depends principally on the distance of the animals from the observer, but may also depend on other factors such as group size and sea state.

In the absence of a line-transect analysis, the Commission suggests taking estimates of p from other studies which use ships of similar size and searching methods. In the parlance of line-transect analysis, p is a product of the probability of detecting a group of animals directly on the trackline ($g(0)$) and the probability of detecting a group of animals within the half-strip width on each side of the trackline (μ/w, where w is the transect truncation distance beyond which data are not recorded and μ is the effective strip half-width). The effective strip half-width also may be expressed as $\mu = 1/f(0)$, where $f(0)$ is the estimated probability density function of observed perpendicular distances y evaluated at $y = 0$.

Based on the Commission's understanding of the ships and areas for the geophysical surveys, $g(0)$ and $f(0)$ from Barlow (2015) should be appropriate. The species discussed in the references may be different from those observed during the geophysical survey, but data from similar species can be used. Since $g(0)$ and $f(0)$ values for each species or genera depend on group size, BSS, swell height and other factors, those factors should be taken into account if possible.

The probability of detecting a group of cetaceans can therefore be expressed as

$$p = g(0)\frac{\mu}{w} = \frac{g(0)}{w\,f(0)} \ .$$

[49] Given the slow speed of the vessel during geophysical surveys and the perceived abilities of the observers, animals taken by Level A harassment generally should be reported as the actual number of animals observed during surveys. However, if the BSS-specific effective strip half-width is less than the extent of the estimated Level A harassment zones, the extrapolation method discussed herein should be used rather than reporting the uncorrected number of animals observed.

[50] Other references that provide similar information can be used as well.

If there are n sightings of a species along a section of trackline, the estimated number of groups within a given BSS, within a perpendicular distance w on each side of the trackline, and within a given Level B harassment zone[51] is

$$N_{groups} = \frac{n}{p} = \frac{n w f(0)}{g(0)} = \frac{n w}{\mu g(0)} \ ,$$

and the estimated number of individual animals in that given BSS then is

$$N \ = \frac{n}{p} S = \frac{n w}{\mu g(0)} S \ ,$$

where S is the mean group size for the species.

The number of animals seen within each BSS should be summed for each Level B harassment zone. That total number then must be scaled by the distance to the Level B harassment threshold relative to the truncation distance to estimate the total number of animals potentially taken during a given survey.

Example calculation for common dolphins when sightings data are partitioned by group size and BSS

Suppose we have detected n = 3 groups within a BSS of 2, with a mean group size of S = 120, and n = 2 groups within a BSS of 3, with a mean group size of S = 130—both in a Level B harassment radii = 11 km. From Table 2 of Barlow (2015), μ = 3.54 km and w = 5.5 km and μ = 3.24 km and w = 5.5 km from Table 3, $g(0)$ = 0.940. The estimated total number of dolphins potentially taken during the survey is therefore

$$N = \frac{(3)(5.5)}{(3.54)(0.94)} 120 = 595$$
$$N = \frac{(2)(5.5)}{(3.24)(0.94)} 130 = 470$$
$$N = 595 + 470 = 1065 \ \frac{11}{5.5} = 2130$$

One has to be particularly careful when enumerating the number of sightings and mean group size for geophysical surveys. Given that the vessel is traveling so slowly, often a sighting of a large group of animals is observed at a distance and a smaller sub-pod can break off and close in on the vessel. Ideally, each vessel would have a tracker who monitors the position of the different sightings. If the operators are not able to afford a separate individual to track each sighting, the observers must be cognizant of tracking each sighting until it passes abeam. For example, if 65 Pacific white-sided dolphins are observed 2 km from the vessel and then a group of 7 Pacific white-

[51] Which differ depending on water depth and airgun array size.

sided dolphins are observed approaching the vessel[52] a short time later, this should be enumerated as a single sighting of 65 dolphins rather than 2 sightings of 65 and 7 dolphins each. Further, large whales can be documented via multiple sightings. If there are 4 sightings of a single humpback whale and its trajectory has taken it across the path of the vessel, that sighting should be documented as 1 sighting of 1 whale rather than 4 sightings of 1 whale.**

If sightings data partitioned into the various BSSs are not available, an even more simple and rapid method can be used by assuming single, overall values for the various parameters for each species or genera. Those values can be obtained from Barlow and Forney (2007).

The probability of detecting a group of cetaceans again is expressed as

$$p = g(0)\frac{\mu}{w} = \frac{g(0)}{w\,f(0)} \ .$$

If there are n sightings of a species along a section of trackline, the estimated number of groups within a perpendicular distance w on each side of the trackline and within a given Level B harassment zone is

$$N_{groups} = \frac{n}{p} = \frac{n\,w\,f(0)}{g(0)} = \frac{n\,w}{\mu\,g(0)} \ ,$$

and the estimated number of individual animals is

$$N \ = \frac{n}{p}S = \frac{n\,w}{\mu\,g(0)}S \ ,$$

where S is the mean group size for the species. That total number then must be scaled by the distance to the Level B harassment threshold relative to the truncation distance to estimate the total number of animals potentially taken during a given survey.

<u>Example calculation for common dolphins when sightings data partitioned into the various BSSs are not available</u>

Suppose we have detected n = 10 groups, with a mean group size of S = 120 within a Level B harassment radii = 8 km. From Table 1 of Barlow and Forney (2007), μ = 2.22 km and w = 4.0 km and from Table 3, $g(0)$ = 0.970. The estimated total number of dolphins potentially taken during the survey is therefore

$$N = \frac{(10)(4)}{(2.22)(0.97)}120\ \frac{8}{4} = 4458$$

[52] And, if that smaller sub-group comes within the Level A harassment zone, it should be enumerated as such.

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