21 May 2018

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 Scripps Institution of Oceanography (Scripps) 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 north Atlantic Ocean in June and July 2018. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 27 April 2018 notice announcing receipt of the application and proposing to issue the authorization, subject to certain conditions (83 Fed. Reg. 18664).

**Background**

Scripps proposes to conduct a geophysical survey funded by the National Science Foundation (NSF) in international waters near the Mid-Atlantic Ridge. The purpose of the survey is to support a potential future International Ocean Discovery Program project, examine regional seismic stratigraphy, and investigate sediment distribution alterations due to changes in deep-water production. The survey would be conducted along approximately 7,911 km of tracklines in waters estimated to be 1,800 to more than 5,000 m[1] in depth. Scripps would use the R/V *Atlantis* to operate a two-airgun array at a tow depth of 2 to 4 m. In addition, the *Atlantis* would (1) tow a 200 to 600-m hydrophone streamer and (2) use a 3.5-kHz multibeam echosounder and 10.5- to 13-kHz subbottom profiler[2] during the survey. The survey is expected to last for 25 days[3].

NMFS preliminarily has determined that, at most, the proposed activities would result in the incidental taking of small numbers of up to 33 species of marine mammals by Level A and/or B harassment and that any impact on the affected species would be negligible. NMFS does not

[1] The Commission informally noted that water depths were not specified in either the application or *Federal Register* notice. NMFS plans to include them in the final authorization.
[2] The Commission informally noted that the operating frequencies of these sources also were not specified in either the application or *Federal Register* notice. Although NMFS plans to include the information in the final authorization, this has been an ongoing issue for other related authorizations and should be rectified for all future ones.
[3] A 25-percent contingency was added for airgun testing and repeat coverage of any areas where initial data quality is deemed substandard, equating to 31.25 days of activities.

anticipate any take of marine mammals by death or serious injury. It also has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable impact on the affected species or stocks. Those measures include (1) refraining from operating the MBES and SBP in transit to and from the survey area, (2) using two protected species observers to monitor the Level A and B[4] harassment zones for 30 minutes before, during, and for 30 minutes after the survey, (3) implementing speed and course alterations, and (4) using shut-down[5] and ramp-up procedures[6]. In addition, Scripps would shut down the airguns immediately if a large whale[7] with a calf or an aggregation[8] of large whales is observed regardless of the distance from the *Atlantis*. Ramp-up procedures would not be initiated until the animal(s) has not been seen at any distance for 30 minutes. Scripps would report any injured or dead marine mammal to NMFS's Office of Protected Resources using its phased approach.

**Flaws in modeling methodologies**

Scripps used Lamont-Doherty Earth Observatory's (LDEO) model to estimate the extent of the Level A and B harassment zones and the numbers of marine mammal takes. The Commission has raised concerns regarding LDEO's model and has provided extensive comments regarding the inappropriateness of that model[9] for nearly eight years. In more recent years, other stakeholders[10] have expressed similar concerns regarding the appropriateness of those methods (80 Fed. Reg. 67713). LDEO uses the Nucleus source model and a simple ray trace–based modeling approach[11] that assumes spherical spreading, a constant sound speed, and no bottom interactions for surveys in deep water[12] (Diebold et al. 2010). The Commission notes that LDEO's model provides results only to a water depth of 2,000 m—the current survey occurs in waters from 1,800 to more than 5,000 m in depth. The summer sound speed profile in the Mid-Atlantic Ridge area also features a pronounced sound channel at approximately 1,000 m depth and a downward-refracting stratified surface layer[13] that provides effective sound transmission. Both of these features should have been accounted for in any sound propagation modeling approach. Further, many studies, including multiple LDEO-associated studies,[14] have emphasized the importance of

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[4] The Commission informally noted that NMFS omitted the following standard mitigation measure: to implement delay and shut-down procedures, if a species for which authorization has not been granted (including but not limited to North Atlantic right whales) or if a species for which authorization has been granted but the authorized number of takes are met, approaches or is observed within the Level A or B harassment zone. NMFS indicated it would include the measure in the final authorization.

[5] Shut downs would not be required for small delphinids (*Delphinus* spp., *Tursiops* spp., *Stenella* spp., *Steno* spp., and *Lagenorhynchus* spp.) that are traveling and voluntarily approaching the source vessel to interact with the vessel and/or airgun array.

[6] The Commission noted numerous clearance time errors and additional missing information for vessel speed restrictions in both the preamble to and the proposed authorization. NMFS indicated it would revise the measures for the final authorization.

[7] A sperm whale or mysticete.

[8] Six or more individuals that do not appear to be traveling and are feeding, socializing, etc.

[9] Which should be reviewed in conjunction with this letter (see the Commission's 2 May 2016 letter) and are not reiterated herein

[10] Natural Resources Defense Council and Whale and Dolphin Conservation.

[11] Essentially a MATLAB algorithm.

[12] It only

[13] See Figure B-9 in NSF's environmental impact statement regarding geophysical surveys; https://woodshole.er.usgs.gov/project-pages/environmental_compliance/reports/nsf-usgs-final-eis-oeis-with-appendices.pdf

[14] Tolstoy et al. (2004), Tolstoy et al. (2009), Diebold et al. (2010), and Crone et al. (2014).

incorporating site-specific environmental and operational parameters into estimating Level A and B harassment zones.

These issues have been further complicated with the finalization a few years ago 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[15] for the various functional hearing groups.

To do so, LDEO computed 'modified' frequency-weighted, farfield source levels. LDEO noted that those are more appropriate than the 'actual' farfield source levels[16] because an 'actual' farfield source level "does not take into account the interactions of the two airguns that occur near the source center and is calculated as a point source (single airgun)"[17]. The modified farfield source levels[18] are essentially back-calculated source levels[19] based on the relevant frequency-weighted threshold. The *Federal Register* notice further indicated that, although the array effect is not expected to be as pronounced for the two-airgun array as it would be for a larger airgun array, the modified farfield source level was considered more appropriate than use of the actual farfield source level. 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 two-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 wonders why the spectral levels were effectively cut off at 3 kHz, since airguns emit energy above 3 kHz. The Commission suspects that this anomaly occurred because the Nucleus source model only provides data up to 2.5 or 3 kHz, which would affect the estimated ranges to the Level A harassment thresholds for various species (including MF and HF[20] cetaceans and phocids). Airgun sound in the MF and HF[21] range contributes to the overall

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[15] The shot intervals and source velocities were incorrect in both the application and *Federal Register* notice, but the proposed Level A harassment zones apparently were correct based on the $SEL_{cum}$ thresholds. However, the source levels based on peak sound pressure levels ($SPL_{peak}$) for high-frequency (HF) cetaceans were incorrectly noted in the *Federal Register* notice and incorrectly used to estimate the extents of the Level A harassment zones, relevant ensonified areas, and associated number of takes. NMFS plans to include those revisions in the final authorization.

[16] Deemed a 'theoretical representation of the source level' or a 'theoretical far-field signature' in the application.

[17] Where the effects of the array are the greatest and coherent summation does not occur.

[18] Although Scripps 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. Specifically, otariids (OW) for $SEL_{cum}$ thresholds and OW and mid-frequency (MF) cetaceans for $SPL_{peak}$ thresholds (Tables 2 and 4 in UH's application).

[19] Assuming spherical propagation loss.

[20] Particularly since the Level A harassment threshold is 155 dB re 1 $\mu$ $Pa^2$-sec.

[21] 1–10 kHz and > 10 kHz, respectively.

sound exposure level for those species and should not be assumed to be to zero above 3 kHz. Other source models (including Gundalf Optimizer[22] and JASCO's Airgun Array Source Model[23] (AASM)) provide sound levels into the HF range and could have been used.

The use of truncated spectra and modified farfield source levels further support the Commission's continued recommendation that NMFS require LDEO, and in turn Scripps and other affiliated entities[24], to revise their sound propagation modeling methodology. The Commission additionally underscores the need for NMFS to hold LDEO, Scripps, NSF, and affiliated entities 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), as LDEO's model does not represent the best available science. Thus, the Commission again recommends that NMFS require Scripps, in collaboration with 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[25] at a minimum) parameters, (2) a comprehensive source model (i.e., Gundalf Optimizer or AASM) and (3) an appropriate sound propagation model for the proposed incidental harassment authorization. Specifically, the Commission reiterates that LDEO should be using the 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.

**Take estimates and extents of zones in general**

The Commission has repeatedly noted in recent letters that NMFS's proposed numbers of takes are flawed and often illogical. In some instances, NMFS has not proposed sufficient numbers of takes. For example, NMFS routinely fails to increase the numbers of takes to account for average group size or to account for pinnipeds being present in large numbers during construction activities. In other instances, the numbers of takes are exceedingly large for the activities proposed, which generally is the case for Level A harassment[26].

For example, NMFS plans to authorize 42 Level A harassment takes[27] of harbor porpoises in the proposed authorization, equating to more than one take per day of activities. The Commission questions the need to authorize that number of takes. While harbor porpoises generally occur in coastal environments in waters less than 200 m[28], they also can occur in more pelagic waters. Scripps noted in its application that harbor porpoises would be uncommon near the project area where water depths range from 1,800 to more than 5,000 m and estimated the largest

[22] https://www.gundalf.com/environmental/
[23] http://www.nmfs.noaa.gov/pr/permits/incidental/oilgas/boem_2016rule_app_appendix.pdf
[24] Including the U.S. Geological Survey (USGS).
[25] 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.
[26] See the Commission's 12 June 2017 letter.
[27] Based on the revised Level A harassment zones noted herein and assuming area x density x number of days of activities. NMFS originally proposed 41 Level A harassment takes for harbor porpoises in the *Federal Register* notice.
[28] http://www.nmfs.noaa.gov/pr/species/mammals/porpoises/harbor-porpoise.html

Level A harassment zone for harbor porpoises to be approximately 35 m[29]. NMFS also has historically assumed that harbor porpoises display profound and sustained avoidance behavior to sounds greater than 140 dB re 1 μPa (Southall et al. 2007 and Department of the Navy 2017; 83 Fed. Reg. 11006). Thus, harbor porpoises would not be expected to be within 35 m of a vessel, let alone within 35 m of airguns. Further, Scripps proposes to implement a 100-m exclusion zone, which is nearly three times the size of the largest Level A harassment zone. The Commission questions the necessity of a zone that large in general[30].

When asked about all of these matters, NMFS replied that the proposed numbers of takes and extents of zones were likely conservative estimates but since the applicant requested them, it did not think it necessary to deny them. The Commission contends it is NMFS's responsibility to take a step back and determine whether the proposals from applicants are scientifically sound and necessary from biological and ecological perspectives and to work with the applicant to determine whether adjustments should be made. NMFS's reasoning for not revising a request should not be based merely on past practice[31], on what calculations yield, or on what applicants propose. Therefore, the Commission recommends that NMFS better evaluate the numbers of Level A and B harassment takes it plans to propose by considering both ecological/biological information and implementation of mitigation measures for all proposed authorizations prior to submitting them for publication in the *Federal Register*. The Commission is aware that NMFS has reduced the numbers of Level A harassment takes requested by applicants for other proposed authorizations (82 Fed. Reg. 32331) and recommends it do so for Scripps' authorization as well.

The 100-m exclusion zone issue is further exacerbated by the fact that the Level A harassment zone is estimated to be less than 1 m for MF cetaceans. Nevertheless, Scripps plans to implement the 100-m exclusion zone for all MF cetaceans except when delphinids approach the vessel to bow ride. The Commission questions the necessity of those measures during the proposed survey. The Commission has noted that NMFS should be taking a more holistic approach when reviewing the various applications and drafting the proposed authorizations. NMFS should ensure that marine mammals are sufficiently protected from Level A harassment and that activities can be completed in an appropriate manner and within an appropriate timeframe. Thus, the Commission recommends that NMFS more thoroughly assess the proposed exclusion/shut-down zones that are to be implemented for this authorization and, for future proposed incidental take authorizations, prior to publication in the *Federal Register*.

**Rounding of take estimates**

The method used to estimate the numbers of takes[32] during the proposed activities, which summed fractions of takes for each species across project days, does not account for and negates the intent of NMFS's 24-hour reset policy. As the Commission has indicated in previous letters

[29] Based on revisions to the information provided in the *Federal Register* notice as indicated herein. Table 6 of Scripps' application specified the correct Level A harassment zones.
[30] Which also has become another common issue the Commission repeatedly notes in its letters.
[31] The 100-m exclusion zone originated from a 2011 document that was not based on the current Level A harassment thresholds.
[3232] Based on typographical errors in the *Federal Register* notice, NMFS indicated that the numbers of take for Atlantic white-sided dolphins, common bottlenose dolphins, and Risso's dolphins will be reduced by 1 take each in the final authorization.

regarding this matter[33], the issue at hand involves policy rather than mathematical accuracy. The Commission understands that NMFS has nearly completed revising its draft criteria and plans to share them with the Commission in the near term. The Commission recommends that NMFS provide those criteria in a timely manner.

**Proposed one-year authorization renewals**

NMFS has indicated that it may issue a second one-year[34] incidental harassment authorization on a case-by-case basis without additional public notice or comment opportunity when (1) another year of identical, or nearly identical activities, as described in the 'Specified Activities' section of the *Federal Register* notice is planned or (2) the originally planned activities would not be completed by the time the incidental harassment authorization expires and a renewal would allow for completion of the authorized activities beyond the timeframe described in the 'Dates and Duration' section of the notice. NMFS would consider issuing a renewal only if—

- the request for renewal is received no later than 60 days prior to the expiration of the current authorization;
- the activities to be conducted either are identical to the previously analyzed and authorized activities or include changes so minor (e.g., reduction in pile size) that they do not affect the previous analyses, take estimates, or mitigation and monitoring requirements;
- a preliminary monitoring report provides the results of the required monitoring to date and those results do not indicate impacts of a scale or nature not previously analyzed or authorized;
- the status of the affected species or stocks and any other pertinent information, including the mitigation and monitoring requirements, remain the same and appropriate; and
- the original determinations under the MMPA remain valid.

The Commission agrees that NMFS should take appropriate steps to streamline the authorization process under section 101(a)(5)(D) of the MMPA to the extent possible. However, 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) clearly states that proposed authorizations are subject to publication in the *Federal Register* and elsewhere and that there be a presumably concurrent opportunity for public review and comment. NMFS's proposed renewal process would bypass the public notice and comment requirements when it is considering the renewal.

The Commission further notes that NMFS recently implemented an abbreviated authorization process by publishing the required information[35] via an abbreviated *Federal Register* notice and by referencing the relevant documents. The abbreviated process preserves the full opportunity for public review and comment, does not appear to be unduly burdensome on either

[33] See the Commission's 29 November 2016 letter detailing this issue.
[34] 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.
[35] Including any changes to the proposed activities or assumptions made and results from the draft monitoring report.

the applicant or NMFS, and is much preferred over NMFS's proposed renewal process[36]. Thus, the Commission recommends that NMFS refrain from implementing its proposed renewal process and instead use abbreviated *Federal Register* notices and reference existing documents to streamline the incidental harassment authorization process.

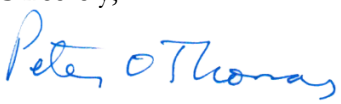
If NMFS believes that its proposed renewal process is consistent with the applicable statutory requirements and intends that process to be generally applicable to all incidental harassment authorizations that meet the specified criteria, it should not seek to adopt such a process through a brief notice at the end of a specific proposed authorization. That process should be adopted through more general procedures, preferably a rulemaking, that provides NMFS's rationale and analysis regarding why it believes the proposed renewal process is consistent with the requirements of section 101(a)(5)(D) of the MMPA and adequate public notice and opportunity for comment. If NMFS adopts the proposed renewal process notwithstanding the Commission's recommendation, the Commission further recommends that NMFS provide the Commission and the public with a legal analysis supporting its conclusion that the process is consistent with the requirements under section 101(a)(5)(D) of the MMPA. Furthermore, if NMFS decides to bypass the notice and comment process in advance of issuing a renewal, it should nevertheless publish notice in the *Federal Register* whenever such a renewal has been issued.

**General comments and concerns**

As with other recent proposed authorizations, the Commission informally noted that the *Federal Register* notice was missing both background information on the proposed activities and multiple mitigation measures. The Commission also noted numerous errors related to the proposed source levels[37], shot intervals, source velocities, and mitigation measures. Although NMFS plans to include all related revisions in the final authorization, the Commission notes that these issues should have been discovered when drafting the proposed authorization and addressed prior to submitting it to the *Federal Register*. Therefore, the Commission recommends that NMFS review more thoroughly applications prior to deeming them complete and its draft notices prior to submitting them for publication in the *Federal Register*.

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

Sincerely,



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

[36] See the Commission's 30 April 2018 letter detailing this matter.
[37] Resulting in changes to the harassment zones, ensonified areas, and number of takes.

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