MARINE MAMMAL COMMISSION

17 September 2018

CDR Patrick Havel
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Dear CDR Havel:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the U.S. Navy's (the Navy) Draft Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement (DSEIS) for Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar (83 Fed. Reg. 45442). The DSEIS addresses the impacts on marine mammals from conducting training and testing activities that use SURTASS LFA sonar and is associated with the letter of authorization (LOA) application that the Navy submitted to the National Marine Fisheries Service (NMFS). The Commission commented on a previous DSEIS in its 27 September 2016 letter. Although that letter was sent two years ago and a final SEIS has been issued, the Navy has yet to sufficiently address the majority of the Commission's concerns or implement its recommendations[1]. Thus, the rationale for recommendations in that letter has been supplemented and many of the recommendations have been reiterated herein.

Background

The Navy proposes to use multiple SURTASS LFA sonar systems for military readiness during training and testing activities from 2019–2026[2]. Activities would occur in the central and western Pacific Ocean and the eastern Indian Ocean. At-sea missions would not exceed 240 days. Under the No Action Alternative, the SURTASS LFA sonar systems would not be operated. Alternative 1 would allow SURTASS LFA sonar to transmit for up to 360 hours per year; whereas, Alternative 2, the Preferred Alternative, would allow up to 496 hours of transmission time in the first four years and 592 hours for each year thereafter. In addition to time-area closures, mitigation measures would include visual, passive acoustic, and active acoustic monitoring to implement delay and shut-down procedures.

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[1] The Navy did provide actual numbers of marine mammal takes rather than the percentage of the stocks that could be taken in the various take tables in the DSEIS.

[2] The timeframe during which a letter authorization issued by NMFS is valid recently was increased from five to seven years based on the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (section 316 of Public Law 115-232).

Uncertainty in density estimates

The Navy estimated marine mammal densities in the 15 representative mission areas based on direct estimates from line-transect surveys that occurred in or near each of the mission areas. If density estimates were not available from a line-transect survey in a specific mission area, then the Navy extrapolated estimates from a region with similar oceanographic characteristics to the mission area. Densities for some mission areas also were derived from the Navy's Global Marine Species Density Database (Global NMSDD; Department of the Navy 2017a), which still is not available to the public for review[3]. The Commission continues to have concerns regarding the density estimates used in other versions of NMSDD and has expressed these in multiple letters including its 13 July 2018 letter regarding Navy activities in the Hawaii-Southern California Training and Testing (HSTT) study area—an area that overlaps with the mission areas in the DSEIS.

HSTT NMSDD included densities derived from (1) models that use line-transect survey sighting data and distance sampling theory, (2) models that use known or inferred habitat associations to predict densities (e.g., relative environmental suitability (RES) models), typically in areas where survey data are limited or non-existent, or (3) extrapolation from neighboring regional density estimates or from other population/stock assessments based on expert opinion. In previous letters the Commission noted that the types of areas[4] from which sightings or abundance estimates were extrapolated vary and numerous correction factors for pinnipeds[5] have been used incorrectly. The Navy has acknowledged that estimates from RES models and extrapolated densities include a high degree of uncertainty (Department of the Navy 2017c), and uncertainty in some of the abundance and density estimates, including coefficients of variation (CVs), were discussed in Appendix D of the DSEIS. However, those measures of uncertainty do not appear to have been incorporated into either the abundance or density estimates in the DSEIS. For all these reasons, the Commission again recommends that the Navy make available to the public the resulting products of the current version of the Global NMSDD, similar to the information provided in Department of the Navy (2017c), as soon as possible and before the revised LOA application is published in the *Federal Register*. The Commission also recommends that the Navy specify whether and how it incorporated uncertainty in its abundance and density estimates[6] and if it did not, incorporate measures of uncertainty inherent in the underlying data (e.g., CV, standard deviations, standard errors) in those estimates and re-estimate the numbers of takes accordingly. For all of its Phase III activities since 2016, including for HSTT, the Navy has been incorporating uncertainty in the

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[3] The Commission discussed this issue in its 2016 letter as well. In the Navy's FSEIS, it indicated that the Global NMSDD is not publically available since proprietary spatial data are included in the database but that products of the Navy's database have been made available to the public (Department of the Navy 2017c). The Commission is not requesting that the spatial data themselves be available to the public but the resulting products, as described in Department of the Navy (2017c) and as provided by the Navy for all other DEISs regarding training and testing activities.

[4] Including the entire range of the stock, the foraging range, the geographic area of occurrence, modeling area, various specified strata, etc.

[5] See the Commission's most recent 13 July 2018 letter on this issue.

[6] The Navy indicated in its FSEIS that information on uncertainty was added to the density and abundance estimates in Chapter 3. Although it appears that various measures of uncertainty were discussed in Chapter 3 in regards to density and abundance estimates but those measures of uncertainty were not specifically incorporated into the estimates used in the various analyses.

densities and the group size estimates[7] that ultimately seed its animat modeling. It is unclear why the same approach was not taken for the DSEIS, particularly since the action areas for HSTT and the DSEIS overlap.

The Navy also used multiple data sources to inform various density estimates stipulated in Table 3-8 of the DSEIS. For example, the Navy cited four different sources (Tillman 1977, Ferguson and Barlow 2001 and 2003, LGL Limited 2008) for the blue whale density estimate in the West Philippine Sea (mission area 3). Two of those sources are from the eastern tropical Pacific Ocean, one is in reference to sei rather than blue whales, and the other likely included density estimates that were themselves extrapolated from another region and/or from sightings data[8]. Not only is the representativeness of those estimates questionable, but it also is unclear whether and how sightings data were used to derive the various densities and whether, when referencing multiple sources, mean or maximum[9] density estimates were used. For these reasons, the Commission recommends that the Navy, in its revised LOA application and final SEIS, specify how density estimates were derived and what statistic (e.g., mean, median, maximum) was used when multiple sources are referenced in Table 3-8.

Single ping equivalent (SPE)

The Navy has used SPE as the metric to estimate behavioral response[10] of marine mammals to SURTASS LFA sonar for more than 18 years. The Navy has described SPE as an intermediate calculation for input into the behavior risk function[11] that accounts for the energy of all LFA sonar transmissions that an animat may receive in a 24-hour period. However, SPE is not an energy-based metric or based on any sort of physical quantity[12]. It is a quasi-metric that the Navy has used to apply its behavior risk function[13] since the first SURTASS LFA sonar EIS was drafted in 1999 and finalized in 2001. The Navy has defined SPE[14] as the sum of the squares of the root-mean-square sound pressures (SP_{rms}) of individual pulses, with units similar to that of root-mean-square sound pressure level (SPL_{rms})[15]; whereas, sound exposure level (SEL) is an energy-based metric related to

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[7] Using means and standard deviations that varied based on a lognormal distribution for densities and either a Poisson or lognormal distribution for group sizes.

[8] Similar issues exist for the blue whale abundance estimate in the West Philippine Sea. The Commission also notes that Thomas et al. (2016) indicated that populations of blue whales in the far west appear to have been extirpated and that abundance estimates of blue whales in the eastern North Pacific Ocean are less than 3,000. Further, NMFS's 2015 stock assessment report for the blue whale stock in the eastern North Pacific Ocean indicated a minimum population estimate of 1,551. Neither estimate supports the Navy's abundance estimate of 9,250 blue whales in the West Philippine Sea, which the Commission finds to be unrealistic.

[9] Or some other statistic.

[10] Level B harassment.

[11] Based on the Feller (1968) function and parameters gleaned from data obtained during the Low Frequency Sound Scientific Research Program (LFS SRP) in 1997 and 1998. LFS SRP yielded little data to inform such functions, likely due to the methods used nearly 20 years ago.

[12] It also is not a metric recognized by either the American National Standards Institute (ANSI) or the International Organization for Standardization (ISO)—the two bodies that define and set standards for metrics involving underwater acoustics.

[13] Which is in units of SPE as well.

[14] See the 2012 final SEIS for the equation.

[15] dB re 1 μPa.

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the summed products of the root-mean-square intensities squared and the signal duration of individual pulses[16], with units dB re 1 μPa^2-sec.

For a single pulse, or for a set of pulses dominated by a single large pulse, the SPE effectively reduces to the SPL_{rms} of the dominant pulse. For multiple pulses, SPE only has a physical interpretation if one assumes that the intensity of a sonar pulse can be negative (in terms of linear SPL_{rms} values or SP_{rms}). Since intensities cannot be negative, SPE has no valid derivation from physical principles. That is, it is not based on an actual physical metric nor is it a metric defined by ANSI or ISO. Thus, SPE is clearly not considered best available science. The Navy has stated that SPE is more conservative than using an SPL-based threshold, although often, it is the same. However, SPE is in fact less conservative than an SEL-based threshold, particularly when multiple pulses of similar intensity are involved. The difference between SPE and SEL increases as the number of pulses received increases, thus SPE becomes less "conservative" with the increasing number of pulses. If the Navy is attempting to account for multiple pulses or energy accumulation in general, it would be prudent to just use SEL-based risk functions rather than a fictitious SPE metric with an associated, yet unsubstantiated risk function.

More to this point, it is unclear how received levels (in units of SPL) from the LFS SRP[17] that apparently were used to inform the shape of the risk function reconcile with the x-axis of that function, which is based on SPE. Since the received levels were not measured in SPE, the Commission is unsure if the LFS SRP data were converted to SPEs but surmises that they were not. Using SPL-based parameters as the basis for an SPE-based function[18] is unfounded.

The Commission's greatest concern regarding the Navy's use of SPE for SURTASS LFA sonar is that the Navy does not use that metric for estimating behavior harassment takes for any other low-frequency (LF) sonar source. Rather, more than 10 years ago, the Navy began using the Feller (1968) function based on SPL-based parameters for most species, with the exception of using an unweighted 140 dB re 1 μPa for beaked whales and 120 dB re 1 μPa for harbor porpoises in recent years (Finneran and Jenkins 2012). Recently for the Phase III EISs, the Navy developed multiple[19] Bayesian biphasic dose response functions[20] (Bayesian BRFs). The Bayesian BRFs were a generalization of the monophasic functions previously developed[21] and applied to behavioral response data[22] (see Department of the Navy 2017b for specifics). The biphasic portions of the functions are intended to describe both level- and context-based responses as proposed in Ellison et al. (2011). Furthermore, the Navy still uses the unweighted 120-dB re 1 μPa threshold for harbor porpoises (Department of the Navy 2017b).

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[16] More simplistically, SPE is merely proportional to intensity and SEL *is* the intensity summed over time.
[17] Which appear to have been inferred based on the location of the whales and vessel rather than obtained via direct measurements from acoustic recording tags on the whales.
[18] The DSEIS also noted that the basement value (B) of the risk function is 120 dB and the 50 percent risk value (K) is 45 dB, but the 2012 final SEIS indicated that B is 119 dB and K is 46 dB.
[19] For odontocetes, mysticetes, beaked whales, and pinnipeds. The Navy used the 120-dB re 1 μPa unweighted, step-function threshold for harbor porpoises as it had done for Phase II activities.
[20] Comprising two truncated cumulative normal distribution functions with separate mean and standard deviation values, as well as upper and lower bounds. The model was fitted to data using the Markov Chain Monte Carlo algorithm.
[21] By Antunes et al. (2014) and Miller et al. (2014).
[22] From both wild and captive animals.

It is unclear whether the SPE-based risk function would be more conservative than the Bayesian BRFs. However, that assumption is not true when comparing the SPE-based risk function and the step-function SPL thresholds for harbor porpoises. This is of concern because although harbor porpoises are less likely than mysticetes to be affected by SURTASS LFA sonar, the Navy has estimated takes for harbor porpoises.

The Commission continues to assert that, if the Navy intended to include a measure of energy in its assessment of behavioral risk from exposure to SURTASS LFA sonar, it would have been more prudent to use SEL- rather than SPE-based thresholds. A review of the history of the use of SPE suggests that it is a metric that continues to be used mainly due to inertia rather than because it is considered the best available science for providing conservative estimates of cumulative impacts of sonar transmissions on marine mammal behavior. For all of these reasons, the Commission recommends that in its revised LOA application and final SEIS, the Navy use either (1) a metric (i.e., SPL or SEL) and associated thresholds that are based on physics rather than SPE or (2) the behavioral response metrics and thresholds that the Navy currently uses for all other LF sonar sources based on Department of the Navy (2017b). In either instance, the Navy should investigate the effects of SURTASS LFA sonar using updated methods, including controlled exposure experiments if feasible, given that the LFS SRP data and methods to obtain such data are more than 20 years old. Specifically, this should be incorporated into the Navy's monitoring plan for the upcoming NMFS rulemaking.

Level A and B harassment takes

The Navy stated that it does not expect its use of SURTASS LFA sonar to cause Level A harassment (PTS) of any marine mammals or stocks based on the application of the full suite of mitigation measures that would be employed when the sonar is transmitting. However, that supposition has not been substantiated and the Commission questions its validity given that SURTASS LFA sonar emits 60-sec transmissions for up to a total of 2.4 hours per day (see section B-4.1 in the DSEIS).

Appendix B, which discussed the marine mammal impact analysis, did not mention inclusion of mitigation within the modeling scenarios or whether modeling was even conducted based on the Level A harassment thresholds. It also is unclear, if Level A harassment takes were estimated, whether those takes were reduced based on presumed mitigation effectiveness—a tack that the Navy has taken for other DEISs. The Navy should have specified if any Level A harassment takes were estimated to occur based on a typical 24-hour scenario rather than asserting that Level A harassment takes would not occur based on implementation of mitigation measures for which effectiveness has yet to be determined. Therefore, the Commission recommends that the Navy specify the numbers of model-estimated Level A harassment takes of marine mammals in the absence of implementing mitigation measures and any and all assumptions (including within the animat modeling scenarios) that were made to reduce those takes to zero in its revised LOA application and final SEIS.

The Commission again noticed that the proposed numbers of takes by temporary threshold shift (TTS) were greater by an order of magnitude than behavior takes for some low-frequency

cetaceans[23] (LF cetaceans; see Tables 4-9 to -11 in the DSEIS). For other LF cetaceans, the TTS and behavior takes were comparable[24]; while for others, the behavior takes were greater than the TTS takes[25], which makes more sense based on real-world scenarios. It is unclear how those trends in takes can occur within the same functional hearing group of animals for which the same thresholds are used. Therefore, <u>the Commission recommends</u> that the Navy ensure that Tables 4-9 to -11 do not contain any errors for the various species of mysticetes or, if the information in the tables is indeed accurate, explain why TTS takes are greater than behavior takes for some species of mysticetes, or stocks of mysticetes within the same species, in its revised LOA application and final SEIS.

Offshore Biologically Important Areas (OBIAs)

Through the implementation of the proposed mitigation measures, the Navy would ensure that SURTASS LFA sonar received levels would be less than 180 dB re 1 μPa[26] within (1) 22 kilometers of any land or (2) the boundary of a designated OBIA[27] during biologically important seasons. Designation of OBIAs was based on the area being inhabited at least seasonally by marine mammal species whose best hearing sensitivity is in the LF range and on the area's biological importance as indicated by (1) its high marine mammal density, (2) its known/defined breeding/calving grounds, foraging grounds, or migration routes, (3) being inhabited by small, distinct populations with limited distribution, or (4) being designated as critical habitat. The Navy currently has recognized 29 OBIAs, with 4 in the mission areas of the DSEIS.

The Navy indicated that four areas are on the OBIA watchlist, including the Paphanāumokuākea Marine National Monument (MNM), the Marianas Trench MNM, and the Pacific Remote Islands MNM. Appendix C of the DSEIS indicated that the Paphanāumokuākea MNM includes the principal distribution range of the critically endangered Hawaiian monk seal and designated critical habitat, as well as a 'great deal of data and information' being available for further assessment. Appendix C also stipulated that 29 species of marine mammals may be present in the waters of the Marianas Islands MNM's island unit and that the three MNMs are being 'carried forward for critical assessment of biological and hearing criteria'. Although it is unclear what being carried forward for assessment actually entails, it is clear that Paphanāumokuākea MNM meets multiple OBIA criteria. The other two MNMs appear to meet the criteria as well. Moreover, critical habitat for the Hawaiian monk seal and the Main Hawaiian Islands insular distinct population segment of false killer whales also clearly meet the OBIA criteria. In addition, the DSEIS indicated that Navy and NMFS are assessing whether 2 important marine mammal areas (IMMAs)[28] and 15 ecologically or biologically significant marine areas (EBSAs)[29] meet the OBIA criteria.

Although numerous types of marine areas are being assessed further, the Commission reminds both the Navy and NMFS that lack of data or insufficient data is not an adequate basis for

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[23] See takes for blue whales in Table 4-11.
[24] See takes for Bryde's whales in Table 4-11.
[25] See western North Pacific gray whales in Table 4-11.
[26] root-mean-square.
[27] Which must be beyond 22 km of land.
[28] Even though three are erroneously listed in Table C-1.
[29] The Commission notes that Tables C-1 and -2 are not consistent with regard to the number of EBSAs that are being assessed further. These issues should be reconciled.

the Navy to refrain from proposing precautionary measures, especially when such data do not exist for most of the world's oceans. This is a point that the Commission made in its 2011 letter on a previous DSEIS and the U.S. Court of Appeals for the Ninth Circuit (the Court) made when it recently remanded the SURTASS LFA sonar case (see *National Resources Defense Council, Inc., et al.* v. *Penny Pritzker et al.*). Specifically, the Court indicated that the Navy and NMFS should have considered whether a precautionary approach would give more protection to marine mammals, and then whether that protection would impede military training to a degree making that mitigation impracticable. Although the Court's decision was issued more than two years ago, it is unclear how the Navy and NMFS plan to supplement the OBIA process and how various marine areas that did not meet the existing OBIA selection criteria and/or were not placed on the OBIA previously are being re-evaluated in accordance with the Court's guidance. It also does not appear that the Navy and NMFS are using the precautionary approach when data are lacking or insufficient, given that the DSEIS indicated that the British Indian Ocean Territory-Chagos Islands Marine Protected Area was not considered further based on insufficient data for being important biologically to marine mammals. The Commission expects that the Navy in its revised LOA application and NMFS in its proposed rule will provide clear justification why any such areas should not be considered an OBIA.

The Commission appreciates the opportunity to provide comments on the Navy's DSEIS. Please contact me if you have questions concerning the Commission's recommendations or rationale.

Sincerely,

Peter O. Thomas, Ph.D.
Executive Director

cc: Jolie Harrison, National Marine Fisheries Service

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