Marine Mammal Commission
4340 East-West Highway, Room 700
Bethesda, MD 20814-4447

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Naval Facilities Engineering Command, Atlantic
Attention: Code EV22 [Atlantic Fleet Sonar Project Manager]
6506 Hampton Boulevard
Norfolk VA 23508-1287

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) provided by the Department of the Navy to evaluate its Atlantic Fleet Active Sonar Training (AFAST) activities. The DEIS identifies and analyzes the environmental effects of three primary alternatives (No Action/Continued Action, Alternative 1, and Alternative 2) and one secondary alternative (Alternative 3) for distributing active anti-submarine warfare (ASW) training and exercises along the U.S. Atlantic and Gulf of Mexico coasts. Based on the DEIS finding of no significant adverse impacts, with mitigation, the Navy applied to the National Marine Fisheries Service for a Letter of Authorization (LOA) under the Marine Mammal Protection Act to authorize the incidental exposure of marine mammals to the sounds emanating from the ASW training activities. The Commission will respond to the LOA application in a separate letter.

The AFAST DEIS provides a more detailed and comprehensive overview of the Navy's ASW equipment and how it is employed in the training of personnel for ASW and mine warfare (MIW) than any prior Navy environmental risk assessment. This level of detail greatly improves the reader's ability to consider the national security and environmental issues within the DEIS alternatives. The Commission commends the Navy for the improvements evident in the DEIS.

## RECOMMENDATIONS

Nonetheless, the Marine Mammal Commission believes that the DEIS requires major revision with regard to the evaluation of action alternatives, estimation of risk, and mitigation of that risk. The Marine Mammal Commission recommends that the Navy—

- rename the "No Action" alternative in this DEIS to something more reflective of the actual level of activity and associated unmitigated risk from that activity;
- provide a more complete and detailed explanation of how the action alternatives were compared;
- alter or augment its risk analysis in Appendix D and the remainder of the DEIS to provide the information the reader would need to evaluate the analyses of costs and risks of the alternatives, which is the basis for making an informed selection;
- include more background in the DEIS and appendices on the methods used to generate the sound exposure numbers and derive the risk plots, which were in turn used to determine the location of exercises under Alternatives 1, 2, and 3; and

- provide a comprehensive description of the various monitoring and mitigation measures that might be used, evaluate the performance of those measures taking into account existing marine mammal monitoring and mitigation data, and instigate planning to evaluate and address the shortcomings of the proposed measures.

**RATIONALE**

DEIS revisions are recommended in the following areas.

***No-Action Alternative:*** In the AFAST DEIS the Navy continues to use the term "No Action" in an unconventional and—in our view—misleading manner as a label for the alternative of continued activity at the current level of effort. The Navy has argued that "No Action" is the appropriate term because "no action" is taken to change the existing level of effort. We believe the term "No Action" should be used for an alternative in which the activity under analysis is not undertaken at all (hence "no action"). The Commission anticipates that the Navy's use of this term will lead to confusion rather than sharpen the understanding of the issues. For example, in this DEIS the no-action alternative is the one posing the greatest environmental risk. In our view, this approach is inconsistent with the intent of the National Environmental Policy Act. For these reasons, the Marine Mammal Commission recommends that the Navy rename the "No Action" alternative in this DEIS to a term that is more reflective of the actual level of activity and associated unmitigated risk from that activity.

***Basis for Comparing Alternatives:*** The Navy identifies the alternative of no change in activity as preferred over Alternatives 1, 2, and 3. To justify this preference, the Navy states in the DEIS that "… Alternatives 1 and 2 would require the relocation of approximately 30 percent of the Navy's current training" (p. ES-7, lines 44–45) and that "…independent of the geographical limitations that would be imposed by Alternative 3; [sic] there is not a significant difference in the analytical results between Alternative 3 and [the Navy's preferred alternative]" (p. ES-7, line 46, to p. ES-8, line 1). The DEIS does not describe why or how 30 percent of the Navy's training events would be relocated under Alternatives 1 and 2, or the impact that relocation would have on cost and effectiveness of training. Doing so seems vital for informed decision-making because those impacts would be offset by reductions in estimated annual marine mammal exposures of some 28 to 40 per cent (from Table ES-3, page ES-23).

Section 2 of the DEIS explains how alternative operating areas were determined. That explanation does not support the contention that the Navy would have to relocate 30 percent of its training activities under Alternatives 1 and 2. Training fidelity was the primary consideration in determining sites of operation, and the sites chosen under Alternatives 1 and 2 meet the four criteria of (1) replication of the threat environments, (2) proximity for multiple assets, (3) safety of personnel, and (4) adequacy of space to carry out the requisite training maneuvers (p. 2-44, lines 8–14, and page 2-53, lines 22–26). Under Alternatives 1, 2, and 3, areas of high risk to marine mammals would be avoided only "to the extent allowable" while still meeting operational requirements (p. 2-71, lines 7–29). The disadvantages of moving 30 percent of training activities

appear to be negligible if, as stated in section 2, activities were only relocated if training realism, logistic cost, and personnel safety were not adversely affected. The environmental benefits of these rejected alternatives are considerable, however, as they reduce the number of exposures by 700,000 to more than 1,000,000. If our interpretation is correct, these results argue strongly against the selection of the Navy's preferred alternative.

***Generation of Sound Exposure Numbers:*** The Commission commends the considerable effort by the Navy and the National Marine Fisheries Service to develop clear, scientifically-based risk criteria despite considerable unknowns. However, the use of those risk criteria to estimate exposures is not adequately explained. Specifically, the characteristics and extent of the 36 "acoustic provinces" used to determine transmission loss in a given area are not shown or described. The DEIS and its appendices state that these provinces are irregularly shaped, but they do not provide a graphic or set of descriptive parameters that would allow one to assess the overlap of acoustic provinces with marine mammal distribution data, as indicated in Figure D-7, that produces the sometimes surprising results in Table ES-3.

To determine marine mammal exposure levels, the DEIS uses some sort of weighting function with five sets of marine mammal density data (i.e., beaked whales, right whales, sperm whales, all odontocetes, and all mysticetes). The actual process for using this data is not clear. On page 2-43, lines 41–42, the weighting process is described in a general way: "… beaked whale seasonal density graphics and exposure grids served as the primary data used to limit the placement of training area locations." The DEIS does not describe whether and to what extent other species were considered. On page 2-54, lines 1–15, the DEIS states that sperm whales and northern right whales were "specifically considered" although beaked whales were the primary consideration. Here, too, the nature of that consideration and the relative weight assigned to conflicting or additive information about risk to right whales versus risk to sperm whales or beaked whales were not described. Alternative 3 relied on, among other considerations, areas of "high" marine mammal density, but the relative density scale as presented in Figure D-1 in Appendix D, page 7, contains seven degrees of relative density from High to Low/Unknown. The DEIS does not describe how the scale was used. For example, did the analysis consider only the highest of the seven densities or multiple densities, and, if more than one density was used, how were the data integrated to identify the most environmentally sensitive areas for the alternatives? Were all species considered and the density information summed or were some species weighted more heavily as in Alternatives 1 and 2?

The maps that were intended to indicate the substantive differences between the four alternatives (e.g., Figures ES-2 through 7) were not effective for that purpose and could be reduced in number and made more informative. Maps of the Navy's preferred alternative and Alternative 3 do not contain the same sonar training and exercise areas shown in maps of Alternatives 1 and 2, so it is not possible to determine where exercises might have been moved or how much available training space was lost or gained relative to the preferred alternative or to Alternative 3. The differences between Alternative 1 and the four seasonal Alternative 2 options can be easily displayed on one map instead of five. We would still have difficulty determining how much training space is actually gained or lost or how that gain or loss translates into actual events lost, moved, or rescheduled, along with the associated costs of such changes. It is these latter considerations that are

important for selecting an alternative, not the relative amount or placement of eligible training areas on the maps. The extensive and largely redundant textual descriptions of each class of activity and where these occur (pages 2-44 through 2-78) do not help us understand what is gained, lost, or changed between alternatives and should be replaced by less text conveying more information of use in evaluating the alternatives.

The models used in Appendices D and H and the data to run them suffer from the same problem; it is not possible to follow the model calculations and reconcile outcomes with input. The description in Appendix H of how exposures were estimated describes a 1-km radius disc around each ping event that clearly does not accommodate the subsequently added analysis for dose-response. The analysis of dose-response involves a much larger zone of influence that is not uniform within its bounds, but instead involves (and must account for) decreasing exposure with increasing range from the source. Page H-6, line 8, refers to a set of figures (Figures 4.3–9) illustrating CASS/GRAB propagation loss calculations that might have offered some insight into how the exposure fields were generated. However, those figures seem to have been eliminated from the DEIS.

The use of two different risk estimation protocols to establish the alternative operating areas (Appendix D) and calculate estimated takes for those areas (Appendix H) results in additional uncertainty and concern. The authors of the DEIS clearly state that they did this largely for computational simplicity and savings of time and effort in setting up the alternatives, and this seems a reasonable course of action. However, the methods applied in Appendix D may be responsible for some of the unexpected and paradoxical results in Table ES-3, which raises questions about the reliability of the exposure estimates as a basis for selecting among the alternatives. It is not clear to us that the exercise described in Appendix D actually had the intended effect of optimizing the balance between relocating sonar activity and reducing exposures, which was the stated intent of Alternatives 1, 2, and 3.

Therefore, the Marine Mammal Commission recommends that the Navy alter or augment its risk analysis in Appendix D to provide the information that the reader would need to evaluate the analyses of costs and risks, which provide the basis for informed selection among the alternatives. The Marine Mammal Commission also recommends that the Navy better explain and illustrate the exposure estimation process in Appendix H to enable the reader to understand, if not verify, the process by which exposure numbers were derived. Doing so is necessary to reconcile the exposure estimates in Table ES-3 with Navy sound production patterns under the four alternatives and with animal distribution and density.

***Monitoring and Mitigation:*** The Commission commends the Navy's commitment to refinement of existing mitigation capabilities such as passive acoustic monitoring and to development of new capabilities for future use. Such investment indicates a sincere commitment to reducing environmental risk from its activities and represents a substantial contribution to national marine environmental stewardship goals. We also commend the establishment of an Integrated Comprehensive Monitoring Plan (ICMP) process (page 5-7) to utilize data from prior events to inform subsequent exercise planning, assess the effectiveness of mitigation, and document trends in

distribution and abundance as well as better document observed effects of Navy sound use on marine mammals. And we commend the Navy's commitment to make effective use, when possible, of independent observer calibration opportunities, tagging and photo-identification efforts, multiple long-term acoustic monitoring resources like HARP and instrumented ranges, plus the collection of oceanographic and environmental data to improve predictive modeling of animal distribution and abundance. Given the existing uncertainties about the magnitude of actual adverse effects from sonar and other human acoustic activities, and our uncertainties about how to most effectively mitigate such effects, an ongoing commitment to assess and improve response is at least as important as the initial response represented by the current DEIS process. The description of the AFAST mitigation protocols, the rationale behind mitigation choices, and the process for verifying and improving performance through the ICMP are all greatly improved over prior Navy sonar environmental analyses.

At the same time, however, the AFAST DEIS could itself be improved in meaningful ways. The DEIS still does not offer realistic estimates of performance for proposed mitigation measures, nor does it contain a concrete plan to verify and validate the levels of performance of watchstanders or other monitoring tools such as passive acoustics. The Commission remains firm in its opinion that the probability of detection from existing monitoring actions, and the subsequent likelihood of implementing source level reductions and other mitigation measures, are actually far below 100 percent or similarly high levels suggested by the Navy. We also remain firmly convinced that the feasibility and cost of such verification and validation tests are well within Navy's capability, and that the value of validating mitigation effectiveness fully justifies the relatively small effort and time required for that purpose. We have noted before that the Navy's own most recent SURTASS LFA EIS included similar analyses. In the absence of such information for the fleet activities described in the AFAST DEIS, we believe it is incumbent upon the Navy to include a plan for obtaining performance data to justify its confidence in such critical mitigation measures as sonar ramp-up, watchstander training effectiveness, and watchstander probability of detecting marine mammals and other species of concern. Validation and verification of system performance is a familiar, well-established, and standard part of research, development, testing, and evaluation processes that precede systems acquisition and fleet use. Performing similar verification and validation for measures to mitigate environmental effects would not be unduly costly and would clarify whether the Navy is, in fact, being realistic in its claims regarding its proposed mitigation efforts.

The Commission generally agrees with the list of rejected mitigation options in section 5.3 (beginning on page 5-10), but we note that the list is poorly organized, redundant, and therefore confusing. The bulleted list would benefit from some editing to ensure that only one point is addressed per bullet and that redundant information in multiple bullets is eliminated. We have reservations about the rationale for not providing some form of mitigation when strong surface ducts are present. Because the detection and response to such ducts has tactical as well as environmental significance, it should not be burdensome to the Navy to determine whether a strong surface duct is present and impose additional precautions. We also are not fully convinced by the rationale for not considering expanded zones of monitoring. Although effective monitoring beyond 1,000 yards may be difficult, it is not impossible. Given the variability of propagation (environmental) conditions, observable animal responses, vessel speeds and maneuvering patterns,

improvements in monitoring capacity, and other relevant variables, monitoring of a larger zone around a sound source should remain an option. Even for defense purposes, we would think that the Navy would want to maximize its ability to observe and monitor the environment around its vessels. The Commission also believes that the criteria for resuming sonar use or increase of source level following reductions should be modified, most especially with respect to the criterion of ship travel. The current criteria invoke any one of three options: (1) the animal is seen leaving (which rarely occurs), (2) the animal is not seen for 30 minutes (which often happens even if the animal is not a deep diver because successive surfacings are not always seen), or (3) the ship travels 1,000 yards beyond the point at which shut-down or a source level reduction was initially required. The last criterion is problematic because distance travelled and time co-vary. Under this criterion, a ship travelling at 10 knots would be able to resume pinging or increase source level after only three minutes. A ship travelling at 15 knots, also not an unreasonable speed during realistic training, could resume within 2 minutes. It seems unlikely that a vessel travelling at those speeds could even respond to the detection and then resume normal activity within that time frame. Therefore a more realistic and safer course of action might be to adopt a simple rule of 30 minutes for most marine mammals and 60 minutes for deep divers like sperm and beaked whales unless the animal is resighted at a safe range before that time.

For these reasons, the Marine Mammal Commission recommends that the Navy (1) implement a plan to obtain monitoring performance validation data before beginning operations under the approved final EIS and LOA, which is likely to be some months off, even under ideal circumstances, and (2) make the recommended editorial and substantive changes to the list of rejected mitigation options.

## DETAILED COMMENTS

The Commission also offers the following detailed comments and questions that we hope will contribute to the clarity and value of the AFAST DEIS.

- On page ES-1, line 27 the word "forth" should be substituted for "fourth."

- On page 1-17, lines 28–29, the Navy concludes that there is no cumulative effect from Outlying Landing Field activities and the activities under this DEIS. However, aircraft noise and even sonic boom are likely to occur over the water areas covered by this DEIS, and prior Navy and Air Force environmental risk assessments have included this source of noise as a possible factor in the sound exposure histories of marine mammals in the area. It therefore seems essential to consider the cumulative effects of noise from aircraft as well as oil and gas industry activities and Navy activities in the Underwater Submarine Warfare Training Range (USWTR) under this DEIS.

- The 200+ kHz MIW sources do not themselves "dissipate"; rather, the energy or sound they produce is "dissipated," or, more correctly, the energy is "absorbed" or attenuated more rapidly than for lower frequency sounds due to the conversion of acoustic energy to mechanical energy

that oscillates the molecular bonds between certain mineral salts dissolved in seawater (p. 2-7, lines 38–39). Similarly, the frequencies of best hearing sensitivity are not "well below that level" (p. 2-8, lines 6–8) but rather are "within" the broader frequency "range" listed (10 Hz to 200 kHz).

- On page 2-9, lines 3–11, and elsewhere in the DEIS and appendices, the nominal source level used for the AN/SQQ-53C and similar mid-frequency sources is 235 dB re 1 micropascal at 1 meter SPL, but in the 2001 Bahamas Interim Report and elsewhere, the Navy has acknowledged a higher, though classified source level for the sonar when in the beamformed (not omnidirectional) mode. The DEIS should clarify whether using the two different source levels will make any difference in the results, and, if so, why the Navy chose to use the simplifying assumption of a constant 235 dB SPL for these sources. The consequences of using a nominal center frequency (3.5 kHz) rather than the full bandwidth of the system or a given signal should also be described. At these frequencies, a difference of 1 or 2 kHz can have dramatic consequences for the propagation of the signal.

- Neither Richardson et al. (1995) nor Wartzok et al. (2003) are the primary, original sources of the behavioral response data cited on page 4-44, line 17. The DEIS should cite the original sources, not a review.

- The DEIS correctly notes that the estimated exposures are not equivalent to the number of individuals exposed, that some animals may receive multiple exposures, and others may receive none over the course of the period of analysis. Nevertheless, each species account, starting with right whales on page 4-93, begins with "up to xxx [species name here] may be exposed…." This is most obviously nonsensical for species like the right whale, whose actual numbers are well known (about 300 to 350) and are well below the estimated number of exposures, in this case 555. Similarly, there are probably not 754,347 individual bottlenose dolphins being exposed or 69,569 harbor seals. The more correct statement is that there are 69,569 exposures, but that it is impossible to estimate the distribution of exposures among the population of harbor seals in the analyzed area.

- The use of passive acoustics to detect marine mammals is described in the monitoring and mitigation chapter on page 5-5. The reader is not given a comparable amount of information about the training and capability of personnel to detect marine mammal sounds and recognize them as such, how they reconcile competing duties for tactical monitoring, or how the passive acoustic information is exactly incorporated into the mitigation decision process. Is it possible to determine range and bearing to the sound or is detection on passive acoustics simply an alert used to cue visual watchstanders? Again, probability of detection performance is not specified and is probably not 90 to 100 percent effective, leaving some doubt as to the overall effectiveness of mitigation monitoring to reduce the risk of death or serious injury to the claimed levels. On page 5-5, lines 19–21, the mitigation criteria specify that passive acoustics will be used when marine mammals are within 200 yards or less of a sonabuoy with active sonar capability. It is not clear how this will be determined or whether it is even possible with current technology.

- On page 5-9, lines 4–10, the Navy describes its plans for coordinating with the National Marine Fisheries Service on occurrences of unusual behavior, live or dead strandings, or observations of floating dead animals within 24 hours of an activity. This seems an unusually short window. We recommend that the coordination begin well in advance of the exercise and continue for as long as a week afterward to account for the potential time lag between when animals are discovered and when the actual interaction might have occurred. The Navy has already had considerable experience with the confusion surrounding the deaths of animals which may occur before an exercise but be attributed to sonar exercises that begin days after the initial stranding or mortality report. Also, the Navy may receive reports of floating or beached dead animals appearing days after the termination of exercise activities. The details of "coordination" also should be provided so that the point of contact in each organization is clear. Also, criteria pertaining to spatial proximity should be clearly defined. As noted in the DEIS, exercises may range over a considerable area. Clearly, it would not be reasonable to coordinate on a stranding in Maine during an exercise in Texas, but should a stranding in Cape Hatteras trigger coordination with an exercise in northern Florida? How will possible connections be determined based on spatial considerations?

- The Commission concurs that the Navy's investment in research on the effects of noise on marine mammals is significant and an indication of its stewardship commitment, but we question whether there is sufficient information to substantiate the Navy's claim that it accounts for 70 percent of all such research in the United States and 50 percent of all such research worldwide (p. 5-9, lines 22–24). It may be harder to substantiate those percentages now than it was five or ten years ago, as the number and relative magnitude of efforts by other nations and nongovernment entities have increased rapidly in recent years.

- The introduction to basic principles of physical acoustics in Appendix G is a useful adjunct to the DEIS. It could usefully be expanded by including more information on ocean acoustic principles that are relevant to the risk calculations, such as factors affecting seasonal average propagation statistics and factors producing strong deviations from seasonal averages, such as internal tides, fronts, and surface ducts or mixing.

- In Appendix H, the complex and difficult process of exposure calculation is explained in some detail, but even for members of our Commission and staff familiar with this process, there are areas where additional explanation, illustrative figures, or other information would have helped. For example, a figure illustrating how the disc-shaped zones of exposure were constructed from eigenray calculations at 45-degree intervals would have been helpful, and a figure illustrating how the depth-dependent exposures were compressed into a single depth-independent area value would have also been useful. The latter illustration seems especially important as integration across the 2-meter depth intervals seems to have differed for shallow and deep water and for species with known vertical "habitat" information (dive data) versus those for which there are no data about maximum or "usual" dive depths. Similarly, it is not clear how the 100-hour exposure histories in Appendix D or the exercise-specific exposure histories used in Appendix H were derived from the actual operating parameters of ships conducting various ASW activities (e.g., ping interval, ship speed, and area of coverage or other similarly relevant data). If there

were simplifying assumptions about the source being stationary or if simplifying techniques were used to produce averaged sound fields over some coarse scale, this did not come through clearly in the DEIS or appendices. For impulse sources such the SSQ-110 sonabuoy or gunnery exercises, the stated assumption on page H-12, lines 4–7, is that these are single discrete events and that there is no need to accumulate recurrent exposures, but it seems possible that individual animals could receive exposures to multiple sonabuoy pings or multiple gunnery discharges within a relatively confined space and period of time. More explanation seems warranted to clarify this point.

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We have tried to keep our recommendations within the demonstrated capabilities of the Navy. We hope that the Commission's comments prove beneficial to the development of the final EIS and request for an LOA under the Marine Mammal Protection Act. Please contact me if you have questions about any of our recommendations or comments.

Sincerely,

Timothy J. Ragen, Ph.D.
Executive Director

Cc: RADM Larry Rice, CNO N45
Hon. Donald Schregardus, DASN E
Craig Johnson, NOAA/NMFS OPR