2 June 2025

Mr. Benjamin Laws, Supervisor
Incidental Take Program
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910-3226

Dear Mr. Laws:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the National Marine Fisheries Service's (NMFS) 9 May 2025 notice (90 Fed. Reg. 19858) and the revised letter of authorization (LOA) application submitted by the U.S. Navy (the Navy)[1] seeking issuance of regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act (the MMPA). The taking would be incidental to conducting training and research, development, test, and evaluation (testing) activities within the Atlantic Fleet Training and Testing (AFTT) study area (Phase IV activities). The Commission reviewed and provided recommendations in its 4 November 2024 letter on the Navy's Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) for conducting training and testing activities in the AFTT study area, which underpins the Navy's LOA application. NMFS authorized the Navy to conduct similar activities first under the Tactical Training Theater Assessment and Planning (TAP I) LOA applications and then again under Phase II and III LOA applications.

Background

The Navy's AFTT study area is in the western Atlantic Ocean and encompasses the waters along the east coast of North America, the Gulf, and portions of the Caribbean Sea, at Navy pier-side locations and in port transit channels, near civilian ports and Coast Guard stations, and in bays, harbors, inland waters, and rivers. The activities would involve the use of low-, mid-, high- and very high-frequency active sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations (including ship shock trials), expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft. In addition to some time-area closures, mitigation measures would include visual monitoring to implement delay and shut-down procedures.

[1] Including the U.S. Marine Corps and on behalf of the U.S. Coast Guard.

Auditory thresholds

As the Commission has noted in letters related to NMFS's *Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing: Underwater and in-air criteria for onset of auditory injury and temporary threshold shifts* (AUD INJ and TTS, respectively; NMFS 2024)[2], the Commission supports the weighting functions and associated thresholds as stipulated in Finneran (2024), which are the same as were used for Navy Phase IV activities (Department of Navy 2025). However, new data have become available since NMFS and the Navy updated the weighting functions and thresholds. For example, Kastelein et al. (2024a) provided additional TTS data for harbor porpoises exposed to one-sixth octave band sound at 8 kHz[3]. Although the Kastelein et al. (2024a) manuscript likely was 'in prep' at the time Finneran (2024) was drafted, it is unclear why the data were not included, as other data that were and/or still are part of 'in prep' manuscripts (i.e., Kastelein et al. 2024b, Reichmuth et al. in prep) were incorporated in Finneran (2024)[4]. The Commission recommends that NMFS determine whether inclusion of the data from Kastelein et al. (2024a, 2025a, 2025b) would alter the weighting functions and/or thresholds for the various functional hearing groups and if so, whether those modifications are sufficient to warrant revision of the current weighting functions and associated thresholds for non-impulsive sources as stipulated in Department of the Navy (2025).

For mysticetes, more recent data were incorporated into the weighting function for Phase IV activities. The first hearing tests were conducted on minke whales in 2023 and showed that the whales were sensitive to frequencies much higher than expected—at least 45 kHz and potentially as high as 90 kHz (National Marine Mammal Foundation (NMMF) 2023, Houser et al. 2024a and 2024b). As such, the Navy split the low-frequency (LF) cetacean functional hearing group into very low-frequency (VLF) and LF cetaceans[5], with the LF cetacean weighting function shifted to the right to encompass higher frequencies. Additional hearing data from 2024 showed that minke whales were the most sensitive at 32 kHz for the frequencies that were tested[6]. Department of the Navy (2025) based various VLF and LF parameters that inform the composite audiograms, weighting functions, and thresholds on the mean or median parameters of the other functional hearing groups. In its 31 August 2015 letter on NMFS's technical guidance and the Navy's original Phase III criteria and thresholds, the Commission recommended that the phocid (PCW) weighting and exposure function parameters be used to inform the LF cetacean weighting and exposure functions[7]. Recently, others[8] also have suggested that mysticete hearing appears to be more similar to that of phocids. Therefore, the Commission recommends that NMFS determine whether the LF cetacean weighting

[2] The Commission appreciates that the Navy, and in turn NMFS, incorporated its recommendations from the Commission's 26 June 2023 letter to (1) include the California sea lion hearing threshold data from Kastelein et al. (2021, 2022a and b, and 2024b) in the derivation of the otariid composite audiogram and revise the weighting function accordingly and (2) fix the rounding issues for *K* to ensure that the impulsive AUD INJ thresholds were 15 dB greater than the TTS thresholds.
[3] Kastelein et al. (2025a) also provided additional TTS data for California sea lions exposed to sound at 40 kHz; while Kastelein et al. (2025b) provided TTS data for harbor seals exposed to sound at 8 kHz.
[4] As well as NMFS (2024) and Department of the Navy (2025).
[5] VLF cetaceans include right, bowhead, fin, and blue whales; whereas, LF cetaceans include minke, sei, Bryde's, Rice's, Omura's, humpback, gray, and pygmy right whales.
[6] Which is part of another in prep manuscript.
[7] Which incorporate the weighting functions and associated weighted thresholds.
[8] D. Houser during his presentation of minke whale hearing results at the Effects of Sound on Marine Mammals meeting.

function has been shifted far enough to the higher frequencies to reflect that 32 kHz was the most sensitive frequency tested in minke whales, determine whether use of the PCW composite audiogram, weighting function, and threshold parameters are more representative of VLF and LF cetaceans than medians and means of the five other functional hearing groups, and work with the Navy to revise the VLF and LF cetacean composite audiograms, weighting functions, and thresholds as needed for impulsive and non-impulsive sources for the final rule and FEIS.

Behavior thresholds for acoustic sources

To further define its behavior thresholds for acoustic sources (i.e., sonars and other transducers), the Navy developed multiple[9] Bayesian biphasic dose-response functions[10] (Bayesian BRFs) for Phase IV activities. The Bayesian BRFs were a generalization of the monophasic functions previously developed[11] and applied to behavioral response data[12] (see Department of the Navy 2025 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). At higher amplitudes, a level-based response relates the received sound level to the probability of a behavioral response; whereas, at lower amplitudes, sound can cue the presence, proximity, and approach of a sound source and stimulate a context-based response based on factors other than received sound level[13]. The Commission agrees that the general method by which Bayesian BRFs have been derived is reasonable. The Commission, however, questions whether best available data were used to inform them.

In its review of Department of the Navy (2025)[14], the Commission notes the following in regard to the BRFs—

- The Navy justified increasing the upper bound of the BRFs from 185 to 200 dB re 1 μPa for Phase IV to account for higher level exposures close to 185 dB re 1 μPa that did not lead to a response.
    - None of the raw behavioral data include exposures above 186 dB re 1 μPa (see Table E-1 in Department of the Navy 2025)[15], and only one individual showed no response above 177 dB re 1 μPa.

[9] For sensitive species (beaked whales and harbor porpoises), odontocetes, mysticetes, and pinnipeds.
[10] 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.
[11] By Antunes et al. (2014) and Miller et al. (2013).
[12] From both wild and captive animals.
[13] e.g., the animal's previous experience, separation distance between the sound source and the animal, sound source speed and heading, and behavioral state of the animal including feeding, traveling, etc.
[14] Department of the Navy (2024a) was revised to be Department of the Navy (2025) based in part on response to comments the Commission provided for the AFTT DEIS, which the Commission appreciates.
[15] The Commission notes that Appendix E in Department of the Navy (2024a) originally specified the highest received level as 185 dB re 1 μPa based on the captive studies. The Navy revised the information regarding sw19_245a in Department of the Navy (2025)—cessation of feeding with a Southall severity score of 5 apparently occurred at a received level of 186 dB re 1 μPa at 3.2 km from the XHPAS-D source rather than at 178 dB re 1 μPa and 0.92 m from the source, as specified in Department of the Navy (2024a). An 8-dB increase in received levels at a much farther distance is not insignificant.

  - Certain species did respond above 177 dB re 1 µPa, but their responses were not considered significant (see additional information regarding cessation of feeding in odontocetes herein).
  - Although the upper bound was set by subject matter experts for Phase III (Department of the Navy 2017a), it appears to have been arbitrarily set for Phase IV. Such a change would result in the Phase IV functions moving farther to the right toward higher received levels, the 50-percent probabilities occurring at higher received levels, the slopes of the functions being less steep, and the overall BRFs for odontocetes and mysticetes[16] being less precautionary as compared to Phase III (see Figure 42 in Department of the Navy 2025 and note the flat slope between 185 and 200 dB re 1 µPa on all BRFs for Phase III).
  - Additionally, Department of the Navy (2025) indicated that the 50 percent probability of a behavioral response was estimated to occur at 185 dB re 1 µPa for the mysticete BRF, 8 dB higher than the TTS threshold for LF or VLF cetaceans.
- None of the Southall et al. (2018, 2019, 2020, 2021a, 2022, 2023) data for the Atlantic behavioral response study (BRS) involving beaked whales and other odontocetes were included. However, 'in prep' data were included for auditory thresholds, and data that were underlying but not specifically included in the publications were used for the BRFs[17]. This information may have been particularly useful in assessing whether the less sensitive BRFs that were developed for Phase IV would have been supported by the Atlantic BRS data.
- Justification was not provided regarding why cessation of feeding or foraging by odontocetes, primarily sperm whales, was considered a significant behavioral response in some instances, but not in other instances[18].
  - Department of the Navy (2025) indicated that duration of response relative to the duration of exposure was factored into whether a moderate response on the Southall severity scale (Southall et al. 2021b) would equate to a significant behavioral response. Generally, moderate responses that lasted the duration of exposure were considered a significant behavioral response. However, in some instances, moderate responses that lasted less than the duration of exposure also were considered a significant behavioral response[19], while in other instances they were not[20].
  - In multiple instances, duration of exposure was not specified. Cessation of foraging was considered significant[21] for some and in other instances it was not[22].
- The odontocete BRF incorporated 30 random samples from the dose-response function developed for just the *moderate and severe responses* of captive bottlenose dolphins (Houser et al. 2013b) to ensure that the 30 captive bottlenose dolphins were represented only once.
  - Using the 30 raw data points from the captive bottlenose dolphins would be the best way of ensuring each individual was represented only once.

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[16] And less precautionary for sensitive species at higher received levels. The Phase IV pinniped BRF is more precautionary than the Phase III BRF, but would have been more so if the upper bound had been 185 dB re 1 µPa.
[17] i.e., data from Jacobson et al. (2022).
[18] See Sw16_126a low LFAS and Sw17_101a low LFAS as examples.
[19] See Sw17_191a normal LFAS as one example.
[20] See Sw17_182a low LFAS as an example.
[21] See Sw16_126a low LFAS and sw19_245a XHPAS-C.
[22] See sw19_241a HPAS-C, sw19_245a XHPAS-D, and sw19_254a HPASF-C.

  - Houser et al. (2013b) included dose-response functions derived from all of the raw data. It is unclear why the Navy used only the moderate and severe responses[23] to derive a new dose-response function for captive bottlenose dolphins, as this would skew the subsequent odontocete BRF to the right, particularly at the lower response probabilities and lower received levels, as seen in Figure 42 in Department of the Navy (2025).
- The sensitive species BRF incorporated 10 random samples from the generalized additive models (GAMs) that were developed from passive acoustic monitoring data in Moretti et al. (2014) and Jacobson et al. (2022)[24] and that ranged from 120 to 180 dB re 1 µPa[25].
  - Department of the Navy did not specify how it handled the fact that the Jacobson et al. (2022) GAM was based on the proportion change in the probability of detecting a group vocal period (GVP; i.e., foraging dive), while the Moretti et al. (2014) GAM included GAMs for both the decrease in the probability of a GVP and the probability of disturbance[26].
  - Department of the Navy (2025) further indicated that both the Moretti et al. (2014) and Jacobson et al. (2022) GAMs were recalculated from 100 to 200 dB re 1 µPa for subsampling purposes. For Moretti et al. (2014), that recalculation would have entailed extrapolation at both the lower and upper bounds of the GAM, since the exposure data were only applicable from 120 to 180 dB re 1 µPa. The Jacobson et al. (2022) GAM was just extrapolated from 165 to 200 dB re 1 µPa, which is not an inconsequential amount of data to be inferring.
  - Jacobson et al. (2022) specifically stated that they did not make an inference on sonar received levels above 165 dB re 1 µPa, because no GVPs were observed above this received level. Since the 10 random samples used for the BRFs were not included in Table 21 or Appendix E of Department of the Navy (2025), it is unclear whether those samples could be causing the lesser sensitivity at the higher received levels in the sensitive species BRF as compared to the Phase III BRF.
  - To equally weight the contributions from the 10 exposures from 3S and BRS field studies and the Moretti et al. (2014) and Jacobson et al. (2022) GAM data, the Navy indicated that it sampled the extrapolated GAMs ten times. However, it is unclear whether each GAM was sampled 10 times or 5 times each to total 10 samples. If the former, then the GAMs would have provided twice the amount of data to the overall BRF as the field studies.
  - It is unclear why similar passive acoustic monitoring data were not used for goose-beaked whales at the Southern California Acoustic Range and minke whales at PMRF, since those data have been collected and reported on as part of the Navy's Marine Species Monitoring Program for Phase III[27].
- For harbor porpoises, multiple received levels were noted for the same individual exposed to the same sound source (i.e., high-frequency active sonar (HFAS)) in Table E-1 of Department of the Navy (2025). Since the specific Kastelein et al. references were not

[23] Low-severity responses were considered non-responses.
[24] Moretti et al. (2014) included data from the range hydrophones at the Atlantic Undersea Test and Evaluation Center, and Jacobson et al. (2022) included data from the Pacific Missile Range Facility (PMRF).
[25] This range is specified in the Department of the Navy (2025) text. Table 21 stated that the exposure range was 120–180 dB re 1 µPa and the response range was 100–200 dB re 1 µPa for Moretti et al. (2014); whereas, the exposure range was specified as 90–165 dB re 1 µPa with a response range of 100–200 dB re 1 µPa for Jacobsen et al. (2022).
[26] i.e., whether the GVP GAMS were considered a one-to-one comparison between the two references.
[27] https://www.navymarinespeciesmonitoring.us/reporting/pacific/. See DiMarzio et al. (2019) as one example.

provided in Table E-1, it is unclear whether the experimental scenarios differed sufficiently and the time between exposures was sufficient for the data to be considered independent or whether *only* the lowest received level for each individual per sonar type (i.e., HFAS) should have been used.
    - It is unclear why the Navy included multiple data points for an individual harbor porpoise exposed to the same sound source, when it included only a single data point for each individual exposed to a given sound source for the other captive species.
- The pinniped BRF incorporated 15 random samples from the dose-response function developed for the *moderate and severe responses* of captive California sea lions (Houser et al. 2013a).
    - It is unclear why the captive dose-response function from Houser et al. (2013a) that was derived from all of the raw data was not used for subsampling.
- Department of the Navy (2025) downgraded two individuals that previously had been considered to have exhibited a significant behavioral response in Department of the Navy (2024a), a humpback whale from the 3S study originally was denoted as exhibiting a Southall severity score of 7[28] and was downgraded to a 0 or no response.
    - Revisions made to Table E-1 in Department of the Navy (2025) were numerous. For example, the received levels at which a response occurred were revised for four of six killer whales from the 3S study and the closest points of approach were revised for six of the eight killer whales, with an increase in the Southall severity score for one whale. Given the number of revisions, it is unclear whether the correct received levels, closest points of approach, and Southall severity scores informed the various BRFs and the Navy's cut-off distances.
- The executive summary, Tables 21–24, Figures 43–45, and accompanying text, as well as Table E-1 in Department of the Navy (2025) included contradictory information regarding the range of received levels for both exposures and responses, distances at which the responses occurred, and the number of significant responses (see the Addendum herein). Additionally, Table 17 and Tables 21–24 included inconsistent information on the most basic data that informed the BRFs, namely the species, the study, and the associated references[29]. Further, Table E-1 does not appear to include the Blainville's beaked whale information from Moretti et al. (2014) and Jacobson et al. (2022). The table also appears to include only the raw data from Houser et al. (2013a, b), not the subsampled data from the re-derived dose-response functions that then were used for the BRFs. Absent consistent information, it is difficult to assess the appropriateness of the various BRFs and the Navy's cut-off distances.

The Commission recommends that NMFS require the Navy to revise Department of the Navy (2025) to clarify and address these points, as that document underpins the current and future Phase IV rulemakings. To increase efficiency for all of the agencies involved and to ensure accurate

[28] Table E-1 in Department of the Navy (2024a) specified that mn12_170 had exhibited prolonged cessation of feeding for Sonar 1, with one animal feeding before the sonar was active and then it stopped feeding with a closest point of approach of 820 m at a received level of 164 dB re 1 μPa. This individual was downgraded to no response at a closest point of approach of 300 m and received level of 174 dB re 1 μPa.

[29] For example, Table 17 indicated that northern bottlenose whales were part of 3S2 as referenced by Kvadsheim et al. (2020); however, Table 21 specified that northern bottlenose whales were part of 3S as referenced by Sivle et al. (2015) and Wensveen et al. (2019). As another example, minke whales were omitted from Table 17 but were included in two separate studies in Table 24.

information is being provided for public comment, the Commission would welcome the opportunity to informally review future versions of the Navy's criteria and threshold documents. The Commission further recommends that NMFS work with the Navy to use the dose-response functions that were developed from all of the raw data rather than those that were regenerated for only moderate and severe responses and to refrain from extrapolating beyond the bounds of the underlying data when revising the BRFs.

To derive criteria and thresholds for auditory and behavioral impacts, new data are being collected and new methods to analyze existing data are continually being developed. The Navy currently implements the thresholds at the animat stage within the Navy Acoustic Effects MOdel (NAEMO; Department of the Navy 2024b) rather than at a post-processing stage after the sound propagation and animat modeling has been conducted. This means that the Navy cannot re-query the animat dosimeters using different thresholds when thresholds change, instead it must rerun the animat portion of NAEMO using the new thresholds. This is not only inefficient, but it reinforces the Navy's and NMFS's reliance on the same outdated thresholds for more than a decade. Criteria and thresholds usually are developed at least three years before a DEIS and proposed rule are finalized, and a final rule is valid for seven years[30]. When Navy-funded projects (e.g., Southall et al. 2018, 2019, 2020, 2021a, 2022, 2023) do not provide the data to the Navy by a specific deadline, those data cannot be incorporated until the next Phase under the current paradigm. Thus, the Navy is not able to benefit from the data that it has funded to be collected, sometimes for at least 15 years, by which time the thresholds are not considered best available.

The Commission understands that the Navy is implementing some NAEMO improvements based on a review conducted by Simmons et al. (2025). Although post-processing application of thresholds was not directly addressed by the Simmons et al. (2025) review, various improvements were recommended involving animat seeding within NAEMO and restructuring the NAEMO database to allow for extraction of exposure data outside of NAEMO. As such, the Commission recommends that NMFS work with the Navy in a concerted manner to incorporate data that support criteria and threshold development more often than on a decadal cycle and to revise NAEMO to implement the relevant criteria and thresholds at a true post-processing stage so that animat dosimeter data can be re-queried if thresholds change, rather than needing to remodel the animat-portion of NAEMO. Similar to the thresholds, densities are incorporated into NAEMO at the animat stage, which means that the Navy cannot change the densities should there be errors. Instead, it must rerun the animat portion of NAEMO using the new densities. This is not only inefficient, but it also has caused NMFS and the Navy to rely on erroneous densities or to scale the take estimates by the relative changes in the densities, which is not necessarily an accurate fix. The Commission additionally recommends that NMFS work with the Navy to reprogram NAEMO to implement densities at a post-processing stage so that densities can be easily revised rather than needing to remodel the animat-portion of NAEMO when density estimates change. Such an improvement was recommended by Simmons et al. (2025) to be addressed through modifications to animat seeding and investigating runs by hearing group within NAEMO.

[30] The same criteria and thresholds also have been used for all DEISs and rulemakings under a given Phase, meaning that the Phase IV thresholds will be used for Navy activities until the Phase IV Gulf of Alaska rulemaking expires in 2037.

Cut-off distances for behavior takes

The Commission remains concerned that, following the development of the BRFs and consistent with Phase III, the Navy and in turn NMFS implemented various cut-off distances beyond which they considered the potential for significant behavioral responses to be unlikely (Table 4 in Department of the Navy 2025 and Table 20 in the preamble to the proposed rule). The Navy previously indicated that the context of the exposure is likely more important than the amplitude at large distances (Department of the Navy 2017a)—that is, the context-based response dominates the level-based response. The Commission agrees with that notion but notes that the Bayesian BRFs specifically are intended to incorporate those factors. Thus, including additional cut-off distances would contradict the data underlying the Bayesian BRFs, negate the intent of the functions, and ultimately underestimate the numbers of takes.

For Phase IV activities, the Navy added a condition that if a take were to occur beyond the relevant cut-off distance but above the 50 percent probability for a given BRF (e.g., a bottlenose dolphin exposed at 18 km and at a received level where the probability of response was 65 percent), it would be considered a significant response. That condition was further qualified based on the Navy assuming that animats would avoid a sound source between the response probabilities of 50 to 90 percent (avoidance is discussed further herein). Regardless of how the cut-off distances were qualified, they remain unsubstantiated and are less than what the Navy and NMFS used for Phase III activities[31].

For harbor porpoises and pinnipeds, no data are currently available on a wild animal's response and relative distance to Navy acoustic sound sources. The sensitive species BRF, that included harbor porpoises and beaked whales, primarily was informed by the passive acoustic monitoring data of Moretti et al. (2014) and Jacobson et al. (2022), which did not include distances to the source. Data for the odonotocete and mysticete BRFs were scant. Department of the Navy (2025) indicated that the models did not select range as a factor in the final BRFs, as it was too confounded with received level. The Navy also indicated that it was not surprising given that only 21 of 196 exposures that informed the four BRFs occurred at 10 km or greater from the sound source—19 animals had no response at all, one had a minor vocal response, and one had a strong avoidance response but it did not last for the full duration of the exposure. Delving into Department of the Navy (2025), Table E-1 specified only 19 exposures occurred at 10 km or more from the sound source. Of those 19 exposures, one animal had a minor vocal response, one had a moderate change in locomotion but did not exhibit avoidance, one had a moderate change its dive profile and resting behavior that lasted less time than the exposure, one stopped singing for as long as or longer than the duration of exposure, one had a strong avoidance response that was considered significant and presumably lasted longer than the exposure, and another animal ceased its feeding, changed its dive and vocal behavior, and exhibited prolonged avoidance behavior. Thirteen animals exhibited no response at ranges of approximately 17 to 232 km from the source (Table E-1). Further, Figures 43–45 in Department of the Navy (2025) are missing certain data that were specified in Table E-1 and in some instances have depicted the data incorrectly in terms of response, range, received level, and/or

[31] For Phase III, two different cut-off distances were used per behavioral group (one for moderate source level, single platform events and one for high source level or multiple platform events). For Phase IV, a single distance was used for all platforms and source levels for each behavioral group, but each of the four distances is less than the cut-off distance for high source level or multiple platform events from Phase III (see Table 4 in Department of the Navy 2025).

sample size relative to Table E-1. These inconsistencies make it difficult to assess the Navy's assumptions regarding cut-off distances similar to the BRFs.

The preamble to the proposed rule and Department of the Navy (2025) are correct in stating that the probability of response at distances of 10 km and farther is not well represented (90 Fed. Reg. 19953). As such, it is unclear how either NMFS or the Navy can assert that those few data points provide support that beyond a certain distance, significant responses are unlikely to occur or that the source-receiver range must be included as a separate consideration to estimate likely significant behavioral reactions. Absence of data means just that, there are no data to support including such cut-off distances or assumptions that a significant response is unlikely to occur beyond a certain distance.

The Navy specified that the probability of significant behavioral responses occurring beyond the cut-off distances at received levels above the 50-percent probability of response is unknown, but was included as a conservative assumption due to the paucity of data (Department of the Navy 2025). In fact, none of the significant behavioral responses observed during BRS studies of sensitive species, mysticetes, and many of the odontocetes occurred above the 50-percent probability of response. Only sperm whales showed a significant behavioral response above the 50-percent probability. That primarily is due to the fact that the overwhelming majority of BRS studies that were included in the analyses did not expose animals to higher received levels. Fourteen of the 15 sperm whales that exhibited significant behavioral responses did so at received levels less than the 50-percent probability of response.

Those examples do not include animals that exhibited behavioral responses deemed insignificant by the Navy but that occurred at quite low received levels and at distances that far exceed the cut-off distance. For example, a sperm whale stopped resting and had a moderate change in its dive profile with a Southall severity score of 6 that occurred for a shorter duration than the exposure. The duration was not specified, but the response did occur 36 km from the sound source and at a received level of 116 dB re 1 µPa (Table E-1 in Department of the Navy 2025)—the cut-off distance for odontocetes is 15 km and the received level for the 50-percent probability of response is 168 dB re 1 µPa. Department of the Navy (2024a) originally specified that this animal had exhibited a significant behavioral response in Table E-1[32]. Although it has been corrected in Department of the Navy (2025), this example still confirms that responses do occur at greater distances and lower received levels than the cut-off distances and 50-percent probability of response portray. And contrary to NMFS's assertion in the preamble to the proposed rule, neither it nor the Navy erred on the cautious side and counted the lower duration responses as take, thereby overestimating Level B harassment by behavioral disturbance to some degree (90 Fed. Reg. 19954). The lower duration exposures were not used to inform the BRFs and the 50-percent probabilities of response (90 Fed. Reg. 19953), and duration is not considered when enumerating take by behavioral disturbance from acoustic sources, which is based on the maximum received sound pressure level[33], an instantaneous metric.

[32] Originally, Table E-1 specified that Sw17_182a exhibited a significant behavioral response of 1 at a received level of 113.6 dB re 1 µPa at 37.8 km from the low LFAS source.
[33] root-mean-square sound pressure level (SPL_{rms}).

Tyack and Thomas (2019) previously highlighted the shortcoming associated with assuming only a portion of the animals respond[34], including that the number of animals that are predicted to have a low probability of response may represent the dominant impact from a given sound source. In addition to concerns voiced by Tyack and Thomas (2019) and the Commission's ongoing concerns, use of cut-off distances has been criticized in public comments as an attempt to reduce the numbers of takes (85 Fed. Reg. 72326). Given the lack of data for certain behavioral groups in general, the Commission again recommends that NMFS refrain from using cut-off distances in conjunction with the Bayesian BRFs and re-estimate the numbers of marine mammal takes based solely on the Bayesian BRFs for the final rule.

Behavior thresholds for explosives[35]

The Navy has acknowledged that very little experimental or observational data exist regarding behavioral responses of marine mammals to underwater detonations (Department of the Navy 2025). In lieu of actual data, the Navy has again assumed and NMFS ultimately used a behavior threshold for explosives that was 5 dB less than the TTS threshold for each functional hearing group (Department of the Navy 2025, 90 Fed. Reg. 19951). The 5-dB value was derived from observed onset behavioral responses of captive bottlenose dolphins during non-impulsive TTS testing[36] (Schlundt et al. 2000). Aside from the issues associated with conducting behavioral response studies on trained animals and using a different metric than all other BRFs or behavior thresholds[37], there is no scientific basis for using data from 1-sec tones to replicate or be comparable to an animal's behavioral response to underwater detonations. The Navy itself in Department of the Navy (2017a) stated that, although data from Schlundt et al. (2000) were used to derive the TAP I/Phase II BRFs for *acoustic sources*, they were not used in the quantitative derivation of the Phase III BRFs (or Phase IV BRFs) because the study was a hearing study where animals were conditioned and reinforced to tolerate high noise levels. It is illogical that the Navy removed such data from the estimation of BRFs for acoustic sources, which are similar to the 1-sec tones used in Schlundt et al. (2000), but then continued to use the same inappropriate data—that underestimate impacts—for a completely different sound source.

Another concerning assumption is that NMFS and the Navy continue to maintain that marine mammals do not exhibit behavioral responses to single detonations (90 Fed. Reg. 19951, Department of the Navy 2025)[38]. The Navy has asserted that the most likely behavioral response would be a brief alerting or orienting response, and if a significant response were to occur from a single detonation, it would be an auditory impact, TTS and AUD INJ, rather than a behavioral response (Department of the Navy 2025). That is nonsensical, since multiple detonations and pulses are more likely to cause auditory damage than a single detonation or pulse. The Navy assumes that significant behavioral reactions would not be expected to occur because no additional detonations

[34] Which corresponds to using various arbitrary cut-off distances.
[35] The Commission appreciates that the Navy incorporated the Commission's previous recommendations and used only the onset mortality, slight lung injury, and slight gastrointestinal tract injury thresholds for estimating the numbers of takes of marine mammals rather than the 50 percent thresholds that were used in Phase III.
[36] Based on 1-sec tones.
[37] Department of the Navy (2025) used the cumulative sound exposure level (SEL_{cum}) metric for behavior thresholds for explosives rather than SPL_{rms}, which is used for behavior thresholds for all other sources. NMFS's behavior thresholds also are based on SPL_{rms} for all other sources.
[38] Including certain gunnery exercises that have several detonations of small munitions occurring within a few seconds.

would follow the initial detonation, which is based on reasoning that it historically has applied to shock trials (Department of the Navy 2025). Historical reasoning, which dates back to 1998, is irrelevant, particularly when it defies common sense. There were no data then, and there are no data now to support the assumption that animals would not respond behaviorally to a single detonation that could be up to 58,000 lbs in net explosive weight (NEW)[39].

Larger single detonations (such as explosive torpedo testing or ship shock trials[40]) are expected to elicit 'significant behavioral responses' as described in Department of the Navy (2025). However, neither the Navy nor NMFS has yet to justify why it believes that an animal would exhibit a significant behavioral response to two 5-lb charges detonated within a few minutes of each other but would not exhibit a similar response for a single detonation of 50 lbs, let alone detonations of up to 14,500 lbs. In response to Commission comments on the AFTT Phase III DEIS, the Navy indicated that there is no evidence to support that animals have significant behavioral reactions to temporally and spatially isolated explosions and that it has been monitoring detonations since the 1990s and has not observed those types of reactions. Due to human safety concerns, the Navy has never stationed personnel at the target site to monitor marine mammal responses during large single detonations. In other instances (i.e., bombs dropped from aircraft), lookouts are tasked with clearing the mitigation zone, not documenting an animal's behavioral response to the activity.

Although neither NMFS nor the Navy is aware of evidence to support the assertion that animals will have significant behavioral responses to temporally or spatially isolated explosions at received levels below the TTS threshold (85 Fed. Reg. 72325), a lack of evidence, particularly when concerted monitoring has not occurred in the Level B harassment zones during detonations, does not mean that takes have not occurred. Behavior takes from numerous types of activities have not been documented, but the Navy, and in turn NMFS, presumes that they could occur—essentially for all Navy acoustic sources except low- and mid-frequency active sonar. Given the lack of justification for continuing to ascribe validity to assumptions that clearly are not based on best available science, the Commission recommends that NMFS include in the final rule behavior takes of marine mammals during *all* explosive activities, including those that involve single detonations and gunnery exercises that have several detonations occurring within a few seconds, and encourage the Navy to invest resources in conducting BRSs on marine mammals' responses[41], including pinniped responses, to underwater detonations for the derivation of explosive BRFs, or at the very least a source-specific step-function threshold.

Avoidance and other NAEMO limitations

Avoidance—NAEMO does not use moving animats for estimating avoidance, as it does moving sound sources for the propagation model (Department of the Navy 2024b). NAEMO simply simulates an animat moving away from a sound source by mathematically reducing the received SPLs of individual exposures based on a spherical spreading calculation for the source(s) present on each unique platform. Avoidance speeds and durations were informed by a review of available

[39] Takes that were authorized under Phase III compliance documents, and ship shock trial activities for which the Navy conducted in the AFTT study area.
[40] With net explosive weights of 500 to 650 lbs (Bin E11) and 7,250 to 14,500 lbs (Bin E16), respectively, for Phase IV activities.
[41] Living Marine Resources has provided funding for a few opportunistic studies involving behavioral response of cetaceans exposed to underwater detonations (Falcone et al. 2024).

exposure and baseline data (Department of the Navy 2024b). In prior Phases, avoidance was not modeled in NAEMO. Instead, 95 percent of the takes for permanent threshold shift (PTS), now referred to as AUD INJ, predicted by NAEMO were assumed to be reduced to TTS due to avoidance (Department of the Navy 2017b). This reduction was based on the assumption that an animal avoided the AUD INJ zone of a moving MF1 source (i.e., a hull-mounted surface ship sonar as defined in NAEMO).

Department of the Navy (2024b) did not justify why spherical spreading was used rather than the propagation loss resulting from NAEMO modeling for each individual event. The Navy did however specify swim speeds that were used for the various groups for avoidance (see Table 5 in Department of the Navy 2024b). Some of the assumed avoidance speeds are greater than were noted in the underlying references (see Table 8 in Department of the Navy 2024b). For example, Table 8 specified that Kastelein et al. (2018) was one of the references for harbor porpoise avoidance speeds. Even though Table 8 did not specify the speed, Kastelein et al. (2018) indicated that the highest sustainable swim speed for a harbor porpoise responding to pile-driving activities was 7.1 km/hr (or 1.97 m/s). The other harbor porpoise swim speeds mentioned were not sustainable for the duration of a Navy acoustic activity, while the baseline speed specified was 1.5 m/s (Table 8 in Department of the Navy 2024b). As such, it is unclear how a sustained swim speed of 3 m/s can be justified for harbor porpoises (Table 5 in Department of the Navy 2024b). Further, the baseline swim speed in Table 8 was 0.8 m/s for otariids, 0.4 m/s for harbor seals, and less than 1.7 m/s for northern elephant seals. No swim speeds were available for avoiding sound sources, even though the Navy assumed that pinnipeds would avoid them at 2 m/s (Table 5 in Department of the Navy 2024b). Given that harbor seals comprise the vast majority of the phocid takes and swim speeds for a given group should be based on the slowest species, pinniped swim speeds should have been no more than 1 m/s. For these reasons, the Commission recommends that NMFS work with the Navy to use an avoidance swim speed of no more than 2 m/s for harbor porpoises and 1 m/s for pinnipeds and to revise the NAEMO modeling and take estimates appropriately for the final rule.

Moving animats, as well as animat-based avoidance behavior, have been modeled for quite some time. The Navy funded the development of the publicly-available Marine Mammal Movement and Behavior (3MB)[42] model more than 25 years ago (Houser and Cross 1999, Houser 2006) that incorporated moving animats and avoidance behavior. Although never included in NAEMO, 3MB has been modified over the years to be used for geophysical surveys (Zeddies 2015) and has been used as the basis for animat modeling for offshore wind activities (e.g., Denes et al. 2020, Küsel et al. 2022). Since NAEMO's current animat modeling and avoidance processes are not considered best available science and the Navy is implementing improvements, the Commission recommends that NMFS work with the Navy to incorporate moving animats into NAEMO that can actively avoid sound sources based on species-specific dive profiles and swim speeds for Phase V activities and, if that is not feasible, incorporate species-specific swim speeds and the actual modeled sound propagation into NAEMO to simulate avoidance for a given event. Both creating an emulator[43] and running simulation studies outside of NAEMO, as recommended by Simmons et al. (2025), should inform how best to deal with moving animats and implementing avoidance within NAEMO.

[42] http://oalib.hlsresearch.com/Sound%20and%20Marine%20Mammals/3MB%20HTML.htm.
[43] Which is a statistical approximation of a detailed mathematical model or the simulator portion within NAEMO.

Explosive propagation modeling—For Phase II activities, the Navy used its Refraction in Multilayered Ocean/Ocean Bottoms with Shear Wave Effects (REFMS) model to estimate sound propagation associated with underwater detonations. However, the Navy has since used Comprehensive Acoustic Simulation System/Gaussian Ray Bundle (CASS/GRAB) and a similitude equation to model underwater detonations for Phase III and IV activities (Department of the Navy 2017b, Department of the Navy 2024b). The Navy indicated that CASS/GRAB was approved by the Ocean and Atmospheric Master Library (OAML)[44], could vary environmental parameters with range, had a built-in absorption model, and was more numerically stable than REFMS (Department of the Navy 2017b). Although those assertions may be correct, the Navy also has used its Range-Dependent Acoustic Model (RAM) and the Navy's Standard Parabolic Equation (PE) model for non-impulsive sources with frequencies of less than 100 Hz[45] and for water depths of less than 50 m (Department of the Navy 2024b). It is unclear why RAM/PE was not used for underwater detonations that would occur in waters 50 m or less, where CASS/GRAB generally is not used. Further, Department of the Navy (2024b) specified that the similitude equation is valid only over a range of pressures equating to a NEW of up to 28.8 lbs.

Department of the Navy (2017b and 2024b) did indicate that the CASS/GRAB modeling process compared favorably with in-situ data, but the data were for small explosives at short ranges (i.e., no larger than 15-lb charges in less than 5 m of water at a range of hundreds of meters[46]; Deavenport and Gilchrest 2015). Department of the Navy (2017b) specified that data for large explosions *and* at long ranges were needed to fully validate the model. During the most recent ship shock trials off the east coast of Florida in 2021, some such data were collected. Seger et al. (2023) collected in-situ measurements of the three individual shots of a NEW of up to 58,000 lbs fired near the USS Gerald R. Ford for the purpose of validating NAEMO propagation models. The researchers conducted their own modeling using the Peregrine version of RAM/PE for optimal placement of the hydrophones and to compare with the in-situ measurements.

The measured sound levels exceeded what the Navy had estimated for Phase III modeling for the ship shock trials (Bin E17 in Tables 9-15 to 9-22 in Department of the Navy 2017b) by orders of magnitude[47]. For example, the maximum volume modeled out to a radius of 201 km was exceeded for both the SPL_{peak} and SEL_{cum} metrics for PTS and TTS for LF cetaceans[48] (Table 12 in Seger et al. 2023), the largest range of which was estimated by NAEMO to be 47 km. Since the Navy has yet to conduct a rigorous comparison between the radii provided by NAEMO and those measured in-situ, the total amount NAEMO had underestimated the zones is unknown. However, Seger et al. (2023) noted in Table 12 that the impact volumes for PTS and TTS were 16.5 times as large as the Grand Canyon and 1/40th the size of the Gulf[49]. The researchers also noted that the

[44] The Commission notes that CASS/GRAB is OAML-approved only for frequencies higher than 100 Hz per Department of the Navy (2017b). The Navy just uses it down to 25 Hz for impulsive sources.
[45] The main portion of an underwater detonation's energy occurs at frequencies less than 100 Hz.
[46] Parameters which are exceeded by modeled scenarios for even the smallest detonations, Bin E1 (i.e., see Table 2.5-9 in Appendix E of the DEIS).
[47] The Peregrine modeled received levels at the various monitoring device locations were comparable to measured values (Seger et al. 2023).
[48] For unknown reasons, Seger et al. (2023) used the 160 dB re 1 μPa threshold as the behavior threshold, which the Navy has never used for underwater detonations.
[49] For reference, Department of the Navy (2017b) estimated that the TTS zone for the SEL_{cum} threshold was 3.7 km for MF cetaceans.

sound energy from the 2016 ship shock trial of only 10–11,000 lbs reached Ascension Island[50] nearly 8,200 km away at received levels of 135 dB re 1 µPa, thus the far field was a relatively very far distance in that context. For the USS Ford ship shock trial, the maximum received level at the Ascension Island hydrophones was 157 dB re 1 µPa (Seger et al. 2023). Given the comparability of the modeled zones from the Peregrine version of RAM/PE to the measured values and that RAM/PE is already used by the Navy for modeling non-impulsive sources that operate at less than 100 Hz and in shallow water, the Commission recommends that NMFS work with the Navy to use RAM/PE to model all underwater detonations for Phase IV activities for which modeling has not been completed and for all Phase V activities, until such time that CASS/GRAB and the similitude equation have been validated for the range of detonation sizes and environmental parameters (water depth and receiver range) in which it would be used. The Navy has the data to conduct a rigorous comparison of CASS/GRAB and the similitude equation and the in situ measurements of the USS Ford ship shock trial from Seger et al. (2023) to fulfill the project's intent and to inform future rulemakings.

Seger et al. (2023) also were tasked with determining whether vocal activity of odontocetes and mysticetes differed before and after each shot of the ship shock trial. Odontocete vocal activity decreased at four hydrophones, increased at two hydrophones, and remained the same at seven hydrophones. Mysticete vocal activity decreased at eight hydrophones, increased at one hydrophone, and remained the same at four hydrophones. Certain vocal activity changes were statistically significant. Although Seger et al. (2023) did not provide ranges from each of the detonations to the hydrophones, some hydrophones were very likely beyond the range of TTS for LF cetaceans and most definitely beyond the range of TTS for MF cetaceans (47.4 km and 6 km, respectively; Department of the Navy 2017b). Thus, contrary to the Navy and NMFS's continued presumption, behavioral responses do in fact occur at ranges beyond TTS for single detonations.

Pile-driving calculations—The Navy indicated that, based on the best available science regarding animal reactions to sound, selecting a reasonable accumulation period was necessary to accurately reflect the period that an animal is likely to be exposed to the sound (Department of the Navy 2024b). The Navy chose a 5-minute accumulation time for the SEL_{cum} thresholds for AUD INJ and TTS, because most marine mammals should be able to easily move away from the expanding AUD INJ and TTS zones within that timeframe, especially considering that soft-start procedures may warn the animals. This is an interesting justification given that the Navy does not implement, and NMFS has not proposed to require, soft-start procedures during pile-driving training activities. The Navy also suggested that the animal could avoid the zone altogether if it is outside the immediate area when pile driving begins. Those assumptions may hold if an animal avoids pile-driving activities, but many times, certain species such as pinnipeds and bottlenose dolphins do not avoid the activities. As such, the assumed 5-min accumulation time for an entire day of pile driving is insufficient.

Sufficiency aside, that approach is inconsistent with all other incidental take authorizations that NMFS has issued for construction activities[51]. NMFS did not mention the 5-minute accumulation time in the preamble to the proposed rule. It is unclear whether that was an oversight

[50] Where Comprehensive Nuclear-Test-Ban Treaty Organization hydrophones are installed.
[51] https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities and https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.

or intended. Regardless, the 5-minute accumulation time also is inconsistent with the incidental harassment authorization NMFS recently issued to the Navy for pile-driving training activities at Port Hueneme (90 Fed. Reg. 20283), which involves the same type of training activities it plans to authorize under the AFTT rulemaking. For the Port Hueneme authorization, NMFS and the Navy assumed that multiple piles would be driven per day[52] and animals could be exposed for longer than 5 minutes per day[53] (see Table 4 in 90 Fed. Reg. 20287). Other pile-driving parameters used to inform the proposed rule were incorrect as well. It appears that a source level of 159 dB re 1 μPa at 10 m not 11 m[54] was used for vibratory installation of 24-in sheet piles. The correct reference distance would result in a behavioral response zone of 4,379 m rather than 3,981 m in Table 28 of the preamble to the proposed rule. At most 300 strikes per pile type also appear to have been used to inform the proposed rule[55], while NMFS assumed that 1,800 strikes would be needed to install a timber pile and 500 strikes for a plastic pile for the Port Hueneme authorization (Table 4, 90 Fed. Reg. 20287).

For these reasons, the Commission recommends that NMFS revise (1) the range to effects for TTS and AUD INJ based on the number of piles of each pile type and installation method that would be installed on a given day, the number of minutes or strikes needed to install each pile to depth, and the correct source levels, including for vibratory installation of 24-in sheet piles, (2) the range to effects for behavioral response for vibratory installation of 24-in sheet piles based on a source level of 159 dB re 1 μPa at 11 m, and (3) the numbers of takes accordingly for the final rule. Such revisions could be implemented in a timely manner because NAEMO was not used for modeling purposes, NMFS's User Spreadsheet was or could easily be used based on the parameters specified in Department of the Navy (2024b). If NMFS is intent on using an accumulation time and notwithstanding the Commission's recommendations about correct source levels, the Commission recommends that NMFS work with the Navy to review its previous monitoring reports for both construction activities and any pile-driving activities associated with TAP I or Phase II and III rulemakings or other incidental harassment authorizations to estimate the mean time an animal is expected to remain near a pile-driving activity and revise the accumulation time, range to effects, and numbers of takes accordingly for the final rule. Since NMFS has issued and the Navy currently has 12 active incidental take authorizations for construction activities and has had at least 35 incidental take authorizations issued in the last 10 years, data should be available to determine whether a 5-minute accumulation time is sufficient for species that are known to remain near pile-driving activities.

Mitigation measures

Mitigation areas—NMFS proposed to limit some Phase IV training and testing activities geographically and temporally in certain mitigation areas. For example, the Navy would be prohibited from detonating explosive sonobuoys *within 3 nmi* of the Northeast North Atlantic Right Whale (NARW) Mitigation Area (Table 73 in the preamble and section 218.84(a)(2)(iii)(C) of the proposed rule), consistent with Phase III activities. However, NMFS did not propose to include the

[52] Up to 12 16-in plastic piles and 30 24-in sheet piles.
[53] Up to 5 minutes per pile for 16-in plastic piles totaling 60 minutes per day and 7 minutes per pile for 24-in sheet piles totaling 210 minutes per day.
[54] See Table 4 (90 Fed. Reg. 20287), which is based on Naval Facilities Engineering Command Southwest (NAVFAC SW; 2020).
[55] Department of the Navy (2024b) specified 35–60 strikes per minute per pile for 5 minutes of activity.

same prohibition for the Southeast NARW Mitigation Area (Table 76 in the preamble and section 218.84(a)(2)(vi)(C) of the proposed rule) or the Rice's Whale Mitigation Area (Table 78 in the preamble and section 218.84 (a)(2)(viii)(B) of the proposed rule). The agency proposed to prohibit use of explosive sonobuoys only in the mitigation areas themselves. Table 73 in the preamble to the proposed rule indicated that the prohibition of detonating explosive sonobuoys within 3 nmi of the Northeast NARW Mitigation Area was designed to further prevent exposure to large and dispersed explosive sonobuoy fields (90 Fed Reg. 19999). The same benefit would apply to the Southeast NARW and Rice's Whale Mitigation Areas, which are intended to minimize impacts to NARWs on their breeding grounds and to a species that numbers far fewer individuals than NARWs. Arguably, these are areas some may consider more important than the Northeast NARW Mitigation Area. In addition, the Navy did not indicate in either its DEIS or revised LOA application that implementation of the mitigation measure was impracticable or unable to be implemented in those two mitigation areas. Since the measures clearly would provide a benefit and are considered practicable, the Commission recommends that NMFS prohibit detonation of explosive sonobuoys within 3 nmi of the Southeast NARW Mitigation Area from 15 November through 15 April and the Rice's Whale Mitigation Area year-round in the final rule consistent with the Northeast NARW Mitigation Area.

The majority of reported lethal vessel strikes of large whales worldwide have occurred when vessels are traveling at speeds greater than approximately 10 knots[56] (Laist et al. 2001, Jensen and Silber 2004, Vanderlaan and Taggart 2007a, Conn and Silber 2013). Therefore, NMFS would require surface ships to maintain a speed of no more than 10 knots during transits and normal firing activities for non-explosive torpedo exercises in the Northeast NARW Mitigation Area (Table 73 in the preamble and section 218.84(a)(2)(iii)(E)(3) of the proposed rule). NMFS also would require the Navy to implement speed reductions after a surface ship observes a NARW, if the vessel is within 5 nmi of a reported sighting, at night, and during periods of reduced visibility (Table 73 in the preamble and section 218.84(a)(2)(iii)(G) of the proposed rule). Similar requirements were proposed for the Southeast NARW Mitigation Area, except the stipulation was for "in poor visibility" (Table 76 in the preamble and section 218.84(a)(2)(vi)(E) of the proposed rule). It is unclear what differentiates periods of reduced visibility and in poor visibility, but presumably the former affords a bit more protection. Since the Southeast NARW Mitigation Area covers the breeding grounds, at a minimum the same level of protection should have been included as was specified for the feeding grounds.

More concerning is that NMFS did not propose any vessel speed reductions for the Rice's Whale Mitigation Area (Table 78 in the preamble to the proposed rule) and that it did not specify what constitutes a speed reduction during normal transits for the two NARW Mitigation Areas. In response to the Commission's recommendation to limit vessel speed to no more than 10 knots in the three mitigation areas for Phase III activities, NMFS noted all of the other vessel speed measures the Navy would be required to implement but did not directly address the vessel speed during transit for NARWs (83 Fed. Reg. 57127). For Rice's whale, NMFS indicated that ship strike takes of Rice's whales were not anticipated due to the low number of animals and limited Navy vessel traffic that overlaps with the whale's habitat (83 Fed. Reg. 57128). NMFS also stated that there had been no

[56] And such limits are commonly used by NMFS to inform its ship strike analyses, including those that inform its Biological Opinions (BiOps) under section 7 of the Endangered Species Act (see, for example, the recent BiOp for oil and gas activities in the Gulf).

documented Rice's whale ship strikes by Navy vessels, therefore, speed restrictions would not lower the already low potential for ship strike for the species (83 Fed. Reg. 57128). The Commission disagrees. Lack of a historical impact does not preclude the Navy from implementing measures to pre-empt one from occurring. That is, NMFS has not limited mitigation measures from being implemented on only species for which an actual impact has been documented. If that were to be the case, mitigation measures would be implemented on very few species and for very few activities. NMFS's response additionally highlights that the measures are considered quite practicable given the limited impact on the Navy's training and testing activities. As such, the Commission again recommends that in the final rule NMFS require Navy surface ships to maintain a speed of no more than 10 knots during transits (1) when a NARW is observed, if the vessels are within 5 nmi of a reported sighting, at night, and during periods of reduced visibility in the Northeast NARW Mitigation Area year-round and the Southeast NARW Mitigation Area from 15 November through 15 April and (1) when a Rice's whale is observed, at night, and during periods of reduced visibility in the Rice's Whale Mitigation Area year-round.

For NARWs, NMFS would require the Navy to obtain sightings data from the NARW Sighting Advisory System or WhaleMap in the Northeast NARW Mitigation Area and from the Early Warning System in the Southeast NARW Mitigation Area. No such sightings databases or systems currently exist for Rice's whales. However, under the Gulf BiOp for oil and gas activities, the Bureau of Ocean Energy Management (BOEM) and the Bureau of Environmental Safety and Enforcement (BSEE) would be required to identify a near real-time platform (e.g., WhaleAlert) to help oil- and gas-related vessels avoid strikes of Rice's whales. BOEM and BSEE, in collaboration with NMFS, also must work to ensure additional devices and near real-time detection data systems are integrated into the near real-time sightings platform to establish an integrated platform for all Rice's whale detections in the Gulf (e.g., WhaleMap). Although those platforms may not be up-and-running for Rice's whales in the Gulf now, they will be within the 7-year timeframe of the Navy's final rule, if issued. Based on the practicability for the various platforms' use in the Northeast NARW Mitigation Area, the Commission recommends that in the final rule NMFS require the Navy to conduct a query of the platform (e.g.., WhaleAlert, WhaleMap, etc.) that houses the Rice's whale sightings once it is established and prior to transiting the Rice's Whale Mitigation Area, provide those sightings data to the lookouts prior to them standing watch, use the data to inform the lookouts' visual observations during vessel transits, and implement speed reductions to 10 knots for surface ships transiting within 5 nmi of a sighting reported in the platform within the previous 24 hours. Since the same divisions within NMFS are handling incidental take authorizations and BiOps, for both the Navy and BOEM/BSEE, coordination of information regarding the establishment and further refinement of the near real-time platform should be easily facilitated. Any modifications to the mitigation requirements for the Rice's Whale Mitigation Area can be addressed during the Navy's Annual Adaptive Management Meetings.

Passive acoustic monitoring—NMFS would require the Navy to use information from passive acoustic detections (presumably from instrumented ranges, sonobuoys, etc.) to inform visual observations of lookouts when passive acoustic devices are already being used in events involving active acoustic sources (Table 52 in the preamble and sections 218.84(a)(1)(i)(B)(3) and (ii)(B)(3) of the proposed rule). Given that visual observations by Navy lookouts have proven to be ineffective (Oedekoven and Thomas 2022)—such that NMFS and the Navy have removed any 'credit' for mitigation implementation from the Phase IV proposed rule and revised LOA application—the currently proposed mitigation measure that still relies on a lookout's visual observations is insufficient. Passive

acoustic monitoring via range instrumentation and sonobuoys has reached the level of performance needed for use during military readiness activities (e.g., Department of the Navy 2013 and 2014, U.S. Air Force (USAF) 2016), contrary to the Navy's stance that they have not. The Navy's mitigation measures have yet to be supplemented from a technology standpoint[57] beyond those measures proposed for TAP I activities more than 15 years ago. Although the DEIS indicated that many of the technologies have yet to reach the level of performance needed for deployment during military readiness activities, many are and have been used by the Department of National Defence (DND) in Canada[58] to supplement detections when there are visual monitoring limitations (Binder et al. 2021, Thomson and Binder 2021, Binder et al. 2024). Therefore, the Commission remains skeptical of the Navy's insistence in the DEIS that use of passive acoustic monitoring is impractical as a precise real-time indicator of a marine mammal's location for mitigation implementation absent a confirmed visual sighting. The Commission recommends that NMFS require the Navy to use its instrumented ranges and sonobuoys to localize marine mammals and implement the relevant mitigation measures during active acoustic events for Phase IV activities in the final rule and to take a harder look at the technologies that the Canadian DND uses during its at-sea activities and incorporate those technologies accordingly for other Phase IV LOA applications.

For the DEIS, the Navy proposed to use passive acoustic detections to inform lookouts prior to initiating detonations only if the passive acoustic devices are already being used during the event. The Commission pointed out in its letter on the AFTT DEIS[59] that passive acoustic monitoring was required for explosive sonobuoys, explosive torpedoes, and sinking exercises for Phase III, had been required for prior Phases' activities, and recommended that it be included for Phase IV activities as well. The Navy did include the measures in its revised LOA application and NMFS included them in the proposed rule, which the Commission appreciates. However, the Commission also recommended that passive acoustic monitoring be required for ship shock trials. It is unclear why passive acoustic monitoring, particularly the use of expendable sonobuoys, has not been a requirement before for ship shock trials. The effectiveness of passive acoustic devices has not diminished nor has use of the devices become impracticable. Ship shock trials are the only activity for which mortalities were estimated to occur (see Table 5.1.1 and 5.1.3 in the revised LOA application) and would occur at most 15 times over the 7-year timeframe for the rulemaking. Thus, minimal effort would be required to minimize any such risk. Since mission effectiveness would not be impacted, the measures are considered practicable, and their implementation would reduce the potential for the most lethal marine mammal impacts, the Commission strongly recommends that NMFS require the Navy to use passive acoustic monitoring prior to and during activities involving ship shock trials in the final rule consistent with explosive sonobuoys, explosive torpedoes, and sinking exercises.

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[57] In fact, over the years some mitigation measures have been removed (i.e., visual observations for surface-to-surface missiles/rockets, passive acoustic monitoring requirements for certain explosive activities) and some of the mitigation zones have been reduced in size (i.e., explosive mine neutralization exercises not involving positive control).

[58] i.e., automated passive acoustic monitoring via fixed hydrophones, mobile autonomous systems, and sonobuoys; detection and tracking capabilities using bottom-mounted hydrophones on instrumented ranges; electro-optical, infrared, and space-based detection methods to supplement naked-eye monitoring.

[59] The Commission appreciates that the Navy included in its revised LOA application that it would delay various activities if floating vegetation or jellyfish were observed in the relevant mitigation zone for active acoustic sources, pile driving, airguns, and explosive activities consistent with Phase III activities and the Commission's recommendation in its letter on the AFTT DEIS. NMFS in turn incorporated those measures into the proposed rule.

Further, since passive acoustic monitoring is not required for surface detonations[60] (i.e., air-to-surface explosive bombs, missiles, rockets), multiple sonobuoys could be deployed with a surface target prior to an activity to better determine whether the target area is clear and remains clear until the munition is launched. This would supplement any pre-activity visual observations for air-to-surface exercises and would serve as the only mitigation measure for surface-to-surface detonations[61]. Specifically, Directional Frequency Analysis and Recording (DIFAR) sonobuoys[62] provide both range and bearing to vocalizing animals, can determine an animal's location and confirm its presence in a mitigation zone, and are routinely used by the Navy.

The Navy itself has drawn attention to the success of using sonobuoys to detect bottlenose dolphins in real-time during mine exercises, provides sonobuoys to researchers for the same purpose of detecting and localizing marine mammals[63], and has highlighted numerous instances of various types of sonobuoys being used to detect and localize baleen whales, delphinids, and beaked whales[64]. A broadband repertoire of frequencies, as well as narrow-band frequencies, can be monitored by sonobuoys.

Moreover, the Commission questions NMFS's supposition that implementing passive acoustic monitoring, particularly for explosive activities, would have significant direct negative effects on mission effectiveness and is considered impracticable, as additional mitigation measures would greatly outweigh any potential minor reduction in marine mammal impacts that might result (90 Fed. Reg. 19990). In the case of underwater and surface-level explosive activities, those additional measures could be the difference between life and death, especially since real-time visual observations of the target site immediately prior to detonation is limited. For these reasons, the Commission again strongly recommends that NMFS require the Navy to use passive acoustic devices (i.e., DIFAR and other types of passive sonobuoys, operational hydrophones) prior to explosive bombing exercises and air-to-surface and surface-to-surface explosive missile and rocket exercises to detect marine mammals and implement the necessary mitigation measures in the final rule.

Other mitigation measures—If an incident involving a marine mammal is observed after an individual detonation during a ship shock trial, NMFS would require the Navy to follow established incident reporting procedures *and* halt any remaining detonations until the Navy can consult with NMFS and review or adapt the mitigation plan (Table 5-3 in the preamble and section 218.84(a)(1)(xiii)(C)(3) of the proposed rule). NMFS would require the Navy to follow the incident reporting procedures for

[60] Mitigation is not required to be implemented at all for surface-to-surface detonations.
[61] The Navy indicated in the DEIS that mitigation would not be effective for vessel-deployed missiles and rockets because of the distance between the firing platform and target location and it would not be possible for vessels to conduct close-range observations due to the length of time (and associated operational costs and exercise delays) it would take to complete observations and then transit back to the firing position (typically 28 to 139 km each way).
[62] And other types of passive (e.g., Vertical Line Array Directional Frequency Analysis and Recording (VLAD)) and active (Directional Command Active Sonobuoy System (DICASS) and the Multistatic Active Coherent (MAC) system and Air Deployed Active Receiver (ADAR)) sonobuoys.
[63] Including DIFAR sonobuoys, which have an upper frequency cutoff of 2.4 kHz, and other types of sonobuoys, including omnidirectional sonobuoys that have a higher frequency cutoff. https://www.navymarinespeciesmonitoring.us/files/4714/0069/6940/Spr14_Sonobuoys_Reasearch_Monitoring.pdf.
[64] e.g., https://exwc.navfac.navy.mil/Portals/88/Documents/EXWC/Environmental_Security/Living%20Marine%20Resources/LMRAnnualReport2018v2.pdf.

other activities[65] but not halt those activities if still ongoing until it consults with NMFS. It is unclear why such a measure would not apply to all activities, as it is not impracticable nor would it impact mission effectiveness. Therefore, the Commission recommends that NMFS require the Navy in the final rule to follow established incident reporting procedures *and* halt any active acoustic, explosive, pile-driving, or airgun activity if a marine mammal is observed to be injured or killed during or immediately after the activity and consult with NMFS to review or adapt the mitigation measures, as necessary.

Least practicable adverse impact standard

The Commission has commented numerous times on NMFS's efforts to develop a policy to interpret and implement the least practicable adverse impact requirement under section 101(a)(5)(A)(i)(II)(aa) of the MMPA[66]. However, NMFS has discounted many of the Commission's previous comments and recommendations (e.g., see the preamble to the AFTT final rule; 83 Fed. Reg. 57117-18). The agency similarly disregarded the Commission's most recent comments and recommendations in its 2022 letter, since NMFS's least practicable adverse impact section in the preamble to the proposed rule for AFTT remains substantively unchanged from previous preambles[67]. The Commission's rationale will not be reiterated but should be considered with the Commission's recommendations herein. The Commission once again recommends that NMFS—

- clearly separate its application of the least practicable adverse impact requirement from its negligible impact determination;
- adopt a clear decision-making framework that recognizes the species and stock component *and* the marine mammal habitat component of the least practicable adverse impact provision and always consider whether there are potentially adverse impacts on marine mammal habitat and whether it is practicable to minimize them;
- rework its evaluation criteria for applying the least practicable adverse impact standard to separate the factors used to determine whether a potential impact on marine mammals or their habitat is adverse *and* whether possible mitigation measures would be effective;
- address these shortcomings by adopting a simple, two-step analysis that more closely tracks the statutory provisions being implemented and, if NMFS is using some other legal standard to implement the least practicable adverse impact requirements, provide a clear and concise description of that standard and explain why it believes it to be "sufficient" to meet the statutory legal requirements; and
- apply these basic steps and criteria consistently for least practicable adverse impact determinations across incidental take authorizations.

Negligible impact determination

Total taking—NMFS applied both qualitative and quantitative analyses to inform its negligible impact determination. For the AFTT proposed rule, the agency used the abundance estimates as determined by either the Navy's underlying density estimates from Department of the Navy (2024c)

[65] Which were not included in the DEIS but were included in the revised LOA application.
[66] For example, see the Commission's 30 May 2017, 16 April 2018, 13 July 2018, 21 August 2019, 12 March 2020, 12 June 2020, and 6 September 2022 letters regarding this matter.
[67] Except for minor edits and inclusion of AFTT-specific information.

or NMFS's stock assessment reports. NMFS then estimated the maximum annual take as a percentage of the stock abundance. For example, there were 112,072[68] total takes of goose-beaked whales in the AFTT study area and the abundance was 4,901 whales (Table 85, 90 Fed. Reg. 20039). This results in the Navy taking approximately 2,287 percent of the Western North Atlantic stock of goose-beaked whales estimated to be present in the AFTT study area. As the Commission has repeatedly stated, that percentage does not provide any information on the number of times an individual could be taken in a given year or the number of days an animal could be taken.

NMFS attempted to qualify how often certain species may be taken in the preamble to the proposed rule. For example for Sowerby's beaked whales, NMFS indicated that it was more likely that some number of individuals would experience a comparatively higher number of repeated takes over a potentially fair number of sequential days, given the high number of takes by harassment as compared to the stock abundance[69] (90 Fed. Reg. 20041). Due to the higher number of repeated takes, NMFS indicated that it was more likely that a portion of the individuals taken by harassment (approximately *50 percent of which would be female*) could be repeatedly interrupted during foraging in a manner and amount such that impacts to the energy budgets of a *small number* of females could cause them to forego reproduction *for a year* (90 Fed. Reg. 20041). Since neither NMFS nor the Navy estimated the number of repeated exposures for a given individual, the sex ratios of those estimated to be taken, the number of animals that would be repeatedly exposed, the number of days an animal could be exposed, or the manner in which any given take impacted an animal (i.e., via loss of foraging time, decrease in energy reserves, or reductions in reproduction), it is unclear how NMFS could make such a definitive statement.

More concerning is the fact that even greater potential impacts were estimated for goose-beaked whales that NMFS did not acknowledge. In fact, NMFS stated that, given the magnitude and severity of the take by harassment and any anticipated habitat impacts, and in consideration of the required mitigation measures and other information presented, the proposed activities were unlikely to result in impacts on the reproduction or survival of any individuals of the Western North Atlantic stocks of beaked whales, including goose-beaked whales (90 Fed. Reg. 20042). For Sowerby's beaked whales, NMFS did not anticipate that the relatively small number of individuals that might exhibit a year of foregone reproduction would adversely affect the stock through effects on either rates of recruitment or survival (90 Fed. Reg. 20042).

Rather than continue to make qualitative statements based on relative proportions or percentages of the stock to estimate impacts on individuals from repeated exposures and population-level consequences, NAEMO should be used to model multi-day events or multiple single-day events to provide the necessary information regarding repeated exposures of individuals. Such data could easily be obtained by querying the animat dosimeters. Something similar was conducted for geophysical and geological activities in the Gulf more than a decade ago (Zeddies et al. 2015 and 2017). Simmons et al. (2025) recommended ways that NAEMO and results from NAEMO could be better used to estimate repeated takes and population-level impacts. To that end, the Commission recommends that NMFS work with the Navy to use NAEMO to conduct modeling of both multi-day events and multiple single-day events to estimate the number of

[68] With only two of those takes by Level A harassment. Such few takes calls into question the manner in which the Navy has implemented avoidance, thereby reducing the higher level takes by AUD INJ.
[69] 2,003 percent of the stock abundance in Table 85 (90 Fed. Reg. 20039).

repeated exposures an individual is expected to incur and to better assess repeated exposures of individuals and population-level consequences.

Mortalities and serious injuries (M/SI)—To help inform its analysis of whether M/SI should be considered negligible, NMFS evaluated whether the proposed M/SI takes would exceed the potential biological removal (PBR)[70] for each stock when those removals are added to other sources of taking by M/SI[71]. The proposed number of takes that could result in M/SI would not equal or exceed PBR for any affected stocks except the Northern Gulf stocks of sperm whales and striped dolphins. NMFS proposed to authorize the taking by M/SI of only one sperm whale and two striped dolphins during the proposed seven-year period (0.14 whales per year from vessel strike in Table 79 and 0.29 dolphins per year from explosive activities in Table 80 in the preamble to the proposed rule, respectively). However, PBR for these stocks would be exceeded due to presumed mortalities attributed to ongoing effects of the *Deepwater Horizon* oil spill (DWH)[72], regardless of any proposed mortalities from Navy activities.

Similar to negligible impact determinations for fisheries-related taking (NMFS 2020), NMFS used a two-tiered approach for determining whether the taking by M/SI was negligible. First, it compared the total M/SI takes to PBR. Then, if the total M/SI takes exceeded PBR, the proposed M/SI takes were evaluated against a separate threshold. For the proposed rule, NMFS compared the proposed M/SI takes to 10 percent of PBR for the Northern Gulf stocks of sperm whales and striped dolphins (90 Fed Reg. 20019 and 20020). Although NMFS had used 10 percent of PBR as a threshold for evaluating whether an activity would have a negligible impact since the mid 1990s, in 2020 the agency adopted a new negligible impact threshold from a single source (NIT_s) in its revised policy directive for evaluating fisheries-related M/SI (NMFS 2020). The Navy's proposed M/SI takes would be less than the NIT_s for both sperm whales and striped dolphins[73]. For consistency with its own policy directive, the Commission recommends that NMFS use the two-tiered approach from NMFS (2020), including using NIT_s instead of 10 percent of PBR, for informing its negligible impact determinations that involve M/SI for the final rule and other incidental take authorizations involving M/SI.

[70] PBR is defined as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.
[71] The other sources of M/SI were based on information contained in NMFS's stock assessment reports and the authorized annual taking by M/SI for the Northeast and Southeast Fisheries Science Center's fisheries research surveys, which overlap with the stocks potentially affected by the Navy's activities.
[72] Based on population models developed to estimate mortalities associated with DWH. See the stock assessment reports and *Deepwater Horizon* Marine Mammal Injury Quantification Team (DWH MMIQT; 2015).
[73] 0.14 vs. 0.26 for sperm whales and 0.29 vs. 0.30 for striped dolphins.

The Commission appreciates the opportunity to provide comments on the proposed rule regarding AFTT training and testing activities. Please contact me if you have questions concerning the Commission's recommendations or rationale.

Sincerely,

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cc: Amy Scholik-Schlomer, National Marine Fisheries Service
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Addendum

The following are some of the errors, inconsistencies, or missing information observed in the Executive summary, Tables 21–24, Figures 43–45, and Table E-1 of Department of the Navy (2025). These issues should be addressed and the various tables, figures, and accompanying text should be revised accordingly.

Executive summary—

- The executive summary indicated that the response received levels (RLs) for sensitive species ranged from 95–138.4 dB re 1 μPa, while Tables 21 and E-1 indicated a range of 95–143 dB re 1 μPa, excluding the extrapolated GAMs data from Moretti et al. (2014) and Jacobson et al. (2022).

Table 21—

- The response RL for Tyack et al. (2011) was denoted as 138.4 dB re 1 μPa in Table 21, while Table E-1 indicated 100 dB re dB re 1 μPa.

Table 22—

- The range of exposure RLs for sperm whales was 73–179 dB re 1 μPa in Table 22, while Table E-1 indicated a range of 99.3–186 dB re 1 μPa. The distances of responses for sperm whales were 0.65–12.3 km in Table 22, while the distances at a response were 0.6–12.3 km in Table E-1.

Table 23—

- The number of significant responses for hooded seals was 12 in Table 23, while only 4 are noted in Table E-1. The range of response RLs for hooded seals was 160–170 dB re 1 μPa in Table 23, while Table E-1 noted a range of 160–169 dB re 1 μPa.

Table 24—

- The range of response RLs for blue whales from the SOCAL BRS was 105–143 dB re 1 μPa in Table 24, while Table E-1 noted a range of 111–146 dB re 1 μPa.
- The distances of responses for humpback whales were 0.1–0.4 km in Table 24, while the distances at a response were 0.26–0.83 km in Table E-1.

Figure 43—

- Although the figure includes nine exposures, the majority do not match the data provided in Table E-1. It also is unclear where the exposures from 140–155 dB re 1 μPa originated, because the RLs in Table E-1 are all less than or equal to 130 dB re 1 μPa. Further, the figure has omitted any RLs less than 98 dB re 1 μPa.

Figure 44—

- The figure specified that 101 exposures were included, whereas only 98 exposures were included in Table E-1. Given the number of exposures included in the figure, its accuracy based on Table E-1 cannot be assessed.

Figure 45—

- The figure specified that 85 exposures were included, whereas only 84 exposures were included in Table E-1.
- The figure included 11 data points indicative of a response, whereas only 9 animals were denoted as exhibiting a significant behavior response in Table E-1.

Table E-1—

- The relevant data from Blainville's beaked whales from Moretti et al. (2014) and Jacobson et al. (2022) were not included in the table. At a minimum, the 10 data points that were randomly subsampled from the Moretti et al. (2014) and Jacobson et al. (2022) extrapolated GAMs should have been included in the table.
- The description of response for the Blainville's beaked whale exposed to MFA sonar from Tyack et al. (2011) indicated that the animal resumed foraging during the exposure, therefore the response did not rise to the level of a response. However, the Southall severity score was denoted as 6 with a 1 for significant behavioral response and a corresponding received level of response of 100 dB re 1 µPa[74].
- Data from the minke whale from the SOCAL BRS from Kvadsheim et al. (2017) was not included in the table.
- The raw data were included in the table for bottlenose dolphins and California sea lions from Houser et al. (2013a, b) rather than the subsampled data from the dose-response functions that the Navy derived specifically from the moderate and severe responses of the dolphins and sea lions.

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[74] Previously for bb12_214a in Appendix E of Department of the Navy (2024a), a RL of 138 dB re 1 µPa was specified as the maximum RL without a response, the Southall severity score was 5, and the significant behavioral response was 0.

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