MARINE MAMMAL COMMISSION

15 April 2019

Naval Facilities Engineering Command, Northwest
NWTT Supplemental EIS/OEIS Project Manager
3730 N Charles Porter Avenue, Building 385
Oak Harbor, WA 98278–3500

Dear Sir or Madam:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the U.S. Navy's (the Navy) Draft Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement (DSEIS) for training and research, development, testing, and evaluation (testing) activities conducted within the Northwest Training and Testing (NWTT) study area (Phase III; 84 Fed. Reg. 11936). The DSEIS addresses the impacts on marine mammals from conducting training and testing activities in the NWTT study area and is associated with the letter of authorization (LOA) application that the Navy submitted to the National Marine Fisheries Service (NMFS). The Navy previously analyzed the various impacts, first under the Tactical Training Theater Assessment and Planning DEISs (TAP I) and second under Phase II DEISs.

Background

The Navy's NWTT study area includes areas off the coasts of Washington, Oregon, and northern California and in Western Behm Canal, Alaska, and areas in the inland waters of Washington. The proposed 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, expended materials, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft. Under the No Action Alternative, the Navy would not conduct training or testing activities[1]. Alternative 1, the Preferred Alternative, includes a representative number of training and testing activities[2], and Alternative 2 includes the maximum number of training and testing activities. In addition to potential time-area closures, mitigation measures would include visual monitoring[3] to implement delay and shut-down procedures.

[1] The Commission appreciates that the Navy included this alternative for Phase III DEISs and DSEISs consistent with DEISs for the Navy's Surveillance Towed Array Sensor System Low Frequency Active (SURTASS) sonar and the Commission's previous recommendations.
[2] Including both increases and decreases in the types and/or tempo of activities analyzed under the previous final EIS.
[3] Passive acoustic monitoring would be required only for explosive sonobuoys and explosive torpedoes.

4340 East-West Highway • Room 700 • Bethesda, MD 20814-4498 • T: 301.504.0087 • F: 301.504.0099
www.mmc.gov

Density estimates

Uncertainty in density estimates—The Commission had recommended in previous letters regarding Navy Phase II activities that the Navy incorporate uncertainty and more refined data in its density estimates, including for cetaceans in regions or seasons that have not been surveyed and for pinnipeds in general. For Phase III activities in the Atlantic Fleet Training and Testing (AFTT) study area and Hawaii-Southern California Training and Testing (HSTT) study area, the Navy used more refined density estimation methods for cetaceans and accounted for uncertainty in those densities and the group size estimates[4] that seeded its animat modeling. Department of the Navy (2018) indicated that uncertainty in group size estimates for NWTT was based on either Poisson or lognormal distributions, but did not indicate whether uncertainty was incorporated in the density estimates and what, if any, distribution was used. Instead, Department of the Navy (2018) merely noted that a compound Poisson-gamma distribution was used for incorporating uncertainty in density estimates for AFTT and a lognormal distribution was used for densities associated with HSTT. The Commission assumes that the Navy incorporated uncertainty in its density estimates for NWTT similar to AFTT and HSTT, but inadvertently omitted that fact in Department of the Navy (2018).

Much of the NWTT density data for its offshore and Western Behm Canal areas[5] is based on either interpolation from density data adjacent to or near the area or extrapolation from other areas[6], particularly for cetaceans. Most data were collected in spring and/or summer but were applied to other seasons. For certain cetacean species, densities were prorated[7]. Thus, uncertainty should have been included in the density estimates. Department of the Navy (2019) included coefficients of variation (CVs) for the various cetacean datasets, and CVs for the underlying abundances that inform the pinniped densities also are available (see, for example, Jefferson et al. 2017, Smultea et al. 2017, and the various NMFS stock assessment reports (SARs)). Those CVs could have been used to inform the relevant standard deviations and underlying distributions. <u>The Commission recommends</u> that the Navy clarify whether and how it incorporated uncertainty in its density estimates for its animat modeling specific to NWTT and if uncertainty was not incorporated, re-estimate the numbers of marine mammal takes based on the uncertainty inherent in the density estimates provided in Department of the Navy (2019) or the underlying references (Jefferson et al. 2017, Smultea et al. 2017, NMFS SARs, etc.).

Pinniped densities—In previous Commission letters regarding activities in NWTT, the Commission recommended that the Navy incorporate telemetry data, appropriate age and sex assumptions, and relevant haul-out correction factors appropriately[8] to better refine its density estimates. The Navy did so for Phase III activities at NWTT and also included density estimates based on finer

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[4] Using means and standard deviations that varied based on either a compound Poisson-gamma or lognormal distribution for densities and Poisson, lognormal, or inverse Gaussian distribution for group sizes.
[5] For NWTT, the Navy delineated three different density areas (i.e., offshore, inland waters, and Western Behm Canal in Alaska), which were differentiated further into various strata within those areas.
[6] For the offshore area, extrapolation was based on areas inshore and to the southeast; while for the Western Behm Canal area, extrapolation was based on areas offshore and to the northwest.
[7] For example, Dall's porpoise density estimates in inland waters of Washington were scaled based on densities of harbor porpoises.
[8] Thus, the percentage of time at sea.

geographic[9] and seasonal scales[10]. The Commission appreciates that the Navy not only incorporated its previous recommendations but also funded various monitoring activities, as well as, more sophisticated analyses to refine its pinniped density estimates in NWTT.

The Commission has a few concerns regarding the underlying abundance data that were used to estimate the various pinniped densities. The abundance estimate for northern fur seals was based on pup count data from 2014 and did not include the more recent data from Bogoslof Island in 2015. In addition, abundances from 2015[11] were adjusted based on relevant growth rates up to 2017 for some species including Steller and California sea lions, Guadalupe fur seals, and northern elephant seals. Since the DSEIS was provided for public comment in 2019 and analyzed activities that would begin in 2020, it is unclear why abundances were not increased based on the relevant growth rates up to at least 2020. Further, the Navy used an incorrect haul-out correction factor for harbor seals in the Strait of Juan de Fuca and the San Juan Islands. The Navy indicated that the region-specific, at-sea correction factor was 37 percent based on Huber et al. (2001) rather than 46 percent[12]. Therefore, the Commission recommends that the Navy (1) revise the various densities for (a) northern fur seals based on the abundance estimate from 2015 that includes data from Bogoslof Island, (b) Steller sea lions, California sea lions, Guadalupe fur seals, and elephant seals based on growth rates up to at least 2020, and (c) harbor seals in the Strait of Juan de Fuca and the San Juan Islands based on 46 rather than 37 percent of the animals being in the water at a given time based on Huber et al. (2001) and (2) re-estimate the numbers of takes accordingly in the final SEIS and its LOA application.

Lack of transparency in density estimates for Western Behm Canal—As noted in previous letters, the Commission had a difficult time determining how some of the densities were calculated for Western Behm Canal. For example, the Navy indicated that various cetacean densities for Western Behm Canal originated from Department of the Navy (2010c). But Department of the Navy (2010c) indicated that the densities in some instances were calculated in Department of the Navy (2009) and were based on Rone et al. (2009) and, in other instances, were based on other documents (e.g., Dahlheim et al. 2009). The Navy does not explain the method by which the densities were calculated nor does it cite the primary reference that substantiated each density estimate in Department of the Navy (2019). The Commission understands that the Navy spent considerable time revising its density estimates but believes that the same level of information should have been provided for certain cetacean densities in Western Behm Canal as provided for the other areas for NWTT. Therefore, the Commission recommends that the Navy provide the method(s) by which species-specific densities were calculated for Western Behm Canal and cite the primary literature from which those data originated in Department of the Navy (2019) for the final SEIS, as well as all technical reports that underpin its density databases for future Phase III and IV DSEISs and DEISs.

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[9] Offshore areas were stratified based on bathymetric features and constraints, while areas in the inland waters of Washington (such as Hood Canal) were further refined based on sub-regions within the larger area.
[10] Estimates for some species were based on monthly rather than seasonal densities.
[11] The Commission notes that the adjusted 2017 abundance estimate for Steller sea lions in Oregon should be 7,580 rather than 7,480 as noted in Department of the Navy (2019).
[12] The haul-out correction factor was 1.85 for the Strait of Juan de Fuca and the San Juan Islands (see Table 2 in Huber et al. 2001), resulting in 54 percent of the seals hauled out and 46 percent in the water at any given time.

Criteria and thresholds

Thresholds in general—As stated in letters related to "NMFS's Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing: Underwater acoustic thresholds for onset of permanent and temporary threshold shifts" (PTS and TTS, respectively; NMFS 2016), the Commission supports the weighting functions and associated thresholds as stipulated in Finneran (2016), which are the same as those used for Navy Phase III activities (Department of the Navy 2017). Although the Navy discussed numerous recent studies involving behavioral audiograms (Branstetter et al. 2017) and TTS (Reichmuth et al. 2016, Kastelein et al. 2017a and c, Popov et al. 2017, Kastelein et al. 2018) in its DSEIS, audiogram data from Kastelein et al. (2017b) were conspicuously absent. The Commission understands that developing weighting functions and associated thresholds is an extensive process[13] and that the Navy cannot amend them with each new published dataset. However, the Navy should discuss within the final SEIS, whether *all* newer data corroborate the current weighting functions and associated thresholds.

Behavior thresholds for non-impulsive sources— To further define its behavior thresholds for non-impulsive sources[14], the Navy developed multiple[15] Bayesian biphasic dose response functions[16] (Bayesian BRFs) for Phase III activities. The Bayesian BRFs were a generalization of the monophasic functions previously developed[17] and applied to behavioral response data[18] (see Department of the Navy 2017 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[19]. The Bayesian BRFs are reasonable and a much-needed improvement on the two dose response functions (BRFs)[20] that the Navy had used both for TAP I and Phase II activities.

The Commission is concerned, however, that following the development of the BRFs, the Navy then implemented various cut-off distances beyond which it considered the potential for significant behavioral responses to be unlikely (Table C.4 in Department of the Navy 2017). The Navy indicated it was likely that the context of the exposure is more important than the amplitude at large distances[21] (Department of the Navy 2017)—that is, the context-based response dominates the level-based response. The Commission agrees with that notion but contends that, although the distance between the animal and the sound source is an important contextual factor, such factors are

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[13] More so than amending point density estimates.
[14] Acoustic sources (i.e., sonars and other transducers).
[15] For odontocetes, mysticetes, beaked whales, and pinnipeds. The Navy used the 120-dB re 1 μPa unweighted, step-function threshold for harbor porpoises as it had done for Phase II activities.
[16] 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.
[17] By Antunes et al. (2014) and Miller et al. (2014).
[18] From both wild and captive animals.
[19] e.g., the animal's previous experience, separation distance between sound source and animal, and behavioral state including feeding, traveling, etc.
[20] One for odontocetes and pinnipeds and one for mysticetes.
[21] For example, the Navy indicated that the range to the basement level of 120 dB re 1 μPa for the BRFs from TAP I and Phase II sometimes extended to more than 150 km during activities involving the most powerful sonar sources (e.g., AN/SQS-53).

included in the Bayesian BRFs. Including additional cut-off distances contradicts the data underlying those functions and negates the intent of the functions themselves.

In addition, the cut-off distances were based on scant acoustic data from a single species each for beaked whales and mysticetes and tag data from Risso's dolphins. Interestingly, Risso's dolphins tens of kilometers from the source exhibited similar responses to those that were within hundreds of meters of the source (Southall et al. 2014). That is, the dolphins did not exhibit any clear, overt behavioral response to either the real mid-frequency (MF) source or the scaled MF source at either distance, and the scaled MF source had to be shut down from full power when the dolphins entered the 200-m shut-down zone. The Commission remains unconvinced of the appropriateness of the cut-off distances.

Moreover, depending on the activity and species, the cut-off distances could effectively eliminate a large portion of the estimated numbers of takes. For sonar bin MF1 (the most powerful mid-frequency active sonars), the estimated numbers of takes would be reduced to zero for odontocetes beginning where the probability of response is 25 percent (Table 3.4-13 in the DSEIS). For mysticetes, takes would be eliminated for MF1 sources at a received level of 142 dB re 1 μPa equating to a probability of response of 13 percent. While that percentage may seem inconsequential, the received level is in fact greater than the level at which actual context-based behavioral responses were observed for feeding blue whales[22] (see Figure 3 in Goldbogen et al. 2013[23]). The Navy attempted to assuage the Commission's concerns in its response to comments regarding the AFTT DEIS by asserting that the use of the Bayesian BRFs in conjunction with the cut-off distances is currently the best known method for providing the public and regulators with a more realistic (but still conservative where some uncertainties exist) estimate of impacts and potential takes. Use of the cut-off distances is neither conservative nor realistic and effectively discounts the underlying data, including Goldbogen et al. (2013), upon which the BRFs are based. For all these reasons, the Commission recommends that the Navy 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. Use of cut-off distances could be perceived as an attempt to reduce the numbers of takes, which is discussed in a subsequent section of this letter.

Behavior threshold for explosives—The Navy assumed a behavior threshold 5 dB lower than the TTS thresholds for each functional hearing group for explosives. That value was derived from observed onset behavioral responses of captive bottlenose dolphins during non-impulsive TTS testing[24] (Schlundt et al. 2000). The justification for the threshold itself is questionable, but more concerning is that the Navy continues to claim that marine mammals do not exhibit behavioral responses to single detonations (Department of the Navy 2017)[25]. The Navy has asserted that the most likely behavioral response would be a brief alerting or orienting response and significant behavioral

[22] Southall et al. (2019) recently analyzed the same data using more complex methods, which resulted in blue whales exhibiting responses at cumulative sound exposure levels ranging from 97 to 155 dB re 1 μPa^2-sec—levels that are less than those that would have been zeroed out based on the Navy's cut-off distances. Further, Goldbogen et al. (2013) asserted that, with increased energetic demands and the need for high-density prey, cessation of feeding for a short time could affect the fitness of blue whales.
[23] Data that also were used to derive the Bayesian BRFs.
[24] Based on 1-sec tones.
[25] Including certain gunnery exercises that involve several detonations of small munitions within a few seconds.

reactions would not be expected to occur if no further detonations followed. Although there are no data to substantiate that assertion, the Navy notes that the same reasoning was used in previous ship shock trial final rules in 1998, 2001, and 2008. Without substantiating data, there is no reason to continue to ascribe validity to assumptions made 10 to 20 years ago. Large single detonations (such as explosive torpedo testing[26]) would be expected to elicit 'significant behavioral responses'[27]. The Navy provided no evidence 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 more than 500 lbs.

In response to the Commission's comments on the AFTT and HSTT DEISs[28], the Navy claimed that there is no evidence to support the notion that animals have significant behavioral reactions to temporally and spatially isolated explosions. Specifically, the Navy noted that it had been monitoring detonations since the 1990s and those types of reactions have not been observed. The Commission is unaware of the Navy ever placing personnel on station to monitor marine mammal responses during large single detonations due to the obvious human safety concerns. For some activities (i.e., missiles launched from a ship), the target area is not cleared prior to the exercise and personnel are 28 to 139 km from the target site. In other instances (i.e., missiles launched and bombs dropped from aircraft), the lookout is tasked primarily with clearing the mitigation zone and realistically only looks for animals in the central portion of that zone immediately prior to the activity commencing. Lookouts are not responsible for documenting an animal's behavioral response to the activity, they are responsible for minimizing serious injuries and mortalities to any observed animal. Additionally, the Commission is unaware of the Navy conducting post-activity monitoring to document injuries or mortalities, let alone behavioral responses, for the majority of these types of activities. The Commission maintains that the Navy has not provided adequate justification for ignoring the possibility that single underwater detonations can cause a behavioral response and therefore again recommends that the Navy estimate and ultimately request authorization for behavior takes of marine mammals during *all* explosive activities, including those that involve single detonations.

Mortality and injury thresholds for explosives—The Commission notes that the constants and exponents[29] associated with the impulse metrics for both onset mortality and onset slight lung injury have been amended from those used in TAP I and Phase II activities. The Navy did not explain why the constants and exponents have changed while the underlying data[30] remain the same. The modifications yield smaller zones[31] in some instances and larger zones in other instances[32]. These results are counterintuitive since the Navy presumably amended the impulse metrics to account for

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[26] With net explosive weights of 500 to 650 lbs (Bin E11).
[27] Including the animals (1) altering their migration path, speed and heading, or diving behavior; (2) stopping or altering feeding, breeding, nursing, resting, or vocalization behavior; (3) avoiding the area near the source; or (4) displaying aggression or annoyance (e.g., tail slapping). These factors were described in Department of the Navy (2017) and used by the Navy to differentiate behavioral response severity.
[28] See its 2 August 2017 letter on AFTT and its November 13 2017 letter on HSTT.
[29] The constants have increased and the exponents have decreased from 1/2 to 1/6.
[30] Based on Richmond et al. (1973), Yelverton et al. (1973), Yelverton and Richmond (1981), and Goertner (1982).
[31] When animals occur at depths between the surface and 8 m, yielding higher absolute thresholds.
[32] When animals occur at depths deeper than 8 m, yielding lower absolute thresholds.

lung compression with depth, thus the zones would be expected to be smaller rather than larger the deeper the animal dives.

The Commission provided similar comments in its letters regarding both the AFTT and HSTT DEISs. However, the Navy did not provide an explanation regarding the constants and exponents nor did it specify the assumptions made in either final EIS. The Navy directed the Commission to Department of the Navy (2017)—the document from which the Commission's comments originated. Therefore, the Commission again recommends that the Navy in its final SEIS (1) explain why the constants and exponents for onset mortality and onset slight lung injury thresholds[33] for Phase III have been amended, (2) ensure that the modified equations are correct, and (3) specify any additional assumptions that were made.

More importantly, the Navy used the onset mortality and onset slight lung injury criteria to determine only the range to effects[34], while it used the 50-percent mortality and 50-percent slight lung injury criteria to estimate the numbers of marine mammal takes[35]. That approach is inconsistent with the manner in which the Navy estimated the numbers of takes for PTS, TTS, and behavior for explosive activities. All of those takes have been and continue to be based on onset, not 50-percent values.

Although the effectiveness of the Navy's mitigation measures[36] has yet to be determined, the circumstances of the deaths of multiple common dolphins during one of the Navy's underwater detonation events in March 2011 (Danil and St. Leger 2011) indicate that the Navy's mitigation measures are not fully effective, especially for explosive activities. It would be more prudent for the Navy to estimate injuries and mortalities based on onset rather than a 50-percent incidence of occurrence. The Navy did indicate that it is reasonable to assume for its impact analysis—thus its take estimation process—that extensive lung hemorrhage[37] is a level of injury that would result in mortality for a wild animal (Department of the Navy 2017). Thus, it is unclear why the Navy did not follow through with that premise.

What is clear is that the 50-percent rather than the onset criteria underestimate both predicted mortalities and injuries. The Navy's response in the AFTT and HSTT final EISs that overpredicting impacts by using onset values would not afford extra protection to any animal[38] is irrelevant from an impact analysis standpoint. The intent of an impact analysis is to describe and estimate impacts (i.e., takes) from the proposed activities accurately. There is no logical reason for basing the estimated impacts on onset of PTS, TTS, and behavioral response for sublethal effects; while for lethal and injurious effects, the impacts are based on a 50-percent criterion. Potential mortalities and injuries should be fully accounted for rather than be erroneously discounted in any impact analysis. The Commission recommends that the Navy use onset mortality, onset slight lung injury, and onset GI tract injury thresholds to estimate both the numbers of marine mammal takes *and* the respective ranges to effect.

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[33] Equations 11 and 12 in Department of the Navy (2017).
[34] To inform the mitigation zones.
[35] A similar approach was taken for gastrointestinal (GI) tract injuries.
[36] Which is discussed further herein.
[37] i.e., onset mortality; see Table 4-1 in Department of the Navy (2017).
[38] And yet the mitigation zones are based on the onset values, so the animals would in fact be afforded 'extra protection'.

Mitigation measures

Mitigation effectiveness—The Navy's proposed mitigation zones are similar to the zones[39] previously used during Phase II activities and are intended, based on the Phase III DSEIS, to avoid the potential for marine mammals to be exposed to levels of sound that could result in injury (i.e., PTS). However, the Phase III proposed mitigation zones would not protect various functional hearing groups from PTS. For example, the mitigation zone for an explosive sonobuoy is 549 m but the mean PTS zones range from 2,321–3,100 m for high-frequency (HF) cetaceans[40]. Similarly, the mitigation zone for an explosive torpedo is 1,920 m but the mean PTS zones range from 13,555–16,639 m for HF cetaceans[41]. The appropriateness of such zones is further complicated by platforms firing munitions (e.g., for missiles and rockets) at targets that are 28 to 139 km away from the firing platform. An aircraft would clear the target area well before it positions itself at the launch location and launches the missile or rocket. Ships, on the other hand, do not clear the target area before launching the missile or rocket[42]. In either case, marine mammals could be present in the target area at the time of the launch unbeknownst to the Navy.

In addition, the Navy indicated in the DSEIS that lookouts would not be 100 percent effective at detecting all species of marine mammals for every activity because of the inherent limitations of detecting marine species and because the likelihood of sighting individual animals is largely dependent on observation conditions (e.g., time of day, sea state, mitigation zone size, observation platform). The Commission agrees and has made repeated recommendations to the Navy regarding the limited effectiveness of visual monitoring. Since 2010, the Navy has been collaborating with researchers at the University of St. Andrews to study Navy lookout effectiveness. The Navy does not appear to have mentioned that study in its DSEIS for Phase III. For its Phase II DEISs, the Navy noted that the data that had been collected could not be analyzed in a statistically significant manner[43]. The Commission understands that point but continues to consider the basic information provided by the studies to be useful[44]. In one instance, the marine mammal observers (MMOs) sighted at least three marine mammals at distances of less than 914 m (i.e., within the mitigation zone for mid-frequency active sonar for cetaceans), which were not sighted by Navy lookouts (Department of the Navy 2012). In other instances, MMOs sighted a group of approximately three dolphins at a distance of 732 m (Department of the Navy 2014a), a group of approximately 20 dolphins at a distance of 759 m (Department of the Navy 2014c), a group of

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[39] The Commission appreciates that the Navy has provided the estimated mean, minimum, and maximum distances for all impact criteria (i.e., behavior, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality) for the various proposed activity types and for all functional hearing groups of marine mammals. That approach is consistent with the Commission's recommendations on Phase II activities.

[40] The maximum range extends to 5,775 m for HF cetaceans (Table 3.4-77) based on varying detonation depths as presented in the DSEIS. The mean PTS zone extends up to 700 m for phocids, with the maximum range extending to 1,275 m.

[41] The maximum ranges extend to 49,275 m for HF cetaceans (Table 3.4-77) based on varying detonation depths as presented in the DSEIS. The mean PTS zones range from 4,277 to 4,388 m with a maximum zone of 9,275 m for phocids; while the mean PTS zones range from 2,845 to 3,284 m with a maximum zone of 7,525 m for low-frequency cetaceans.

[42] The Navy conceded in the DSEIS that mitigation would be ineffective for ships firing missiles at distant targets.

[43] That is, sufficient data had not yet been collected to allow for a meaningful statistical analysis.

[44] The Commission notes that the Navy has been collecting data for nearly 10 years. The Navy should make it a priority to collect sufficient data in the near term to fulfill this project.

approximately 9 pilot whales at a distance of 383 m (Department of the Navy 2014b), and a small unidentified marine mammal at 733 m (Department of the Navy 2014b)—none of which were documented as having been sighted by the Navy lookouts. Further, MMOs have reported marine mammal sightings not observed by Navy lookouts to the Officer of the Deck, presumably to implement mitigation measures (Department of the Navy 2010a). Neither the details regarding those reports nor the raw sightings data were provided to confirm this. More recent data have confirmed the earlier observed trends. Department of the Navy (2016) noted that 10 of the 13 marine mammal sightings[45] occurred at or within 1 km of the vessel, and Navy lookouts only detected 4 of 13 total sightings.

The Commission understands that any data that have been collected since then would still not be sufficient to allow a meaningful statistical analysis. The Commission recognizes that the study will be very informative once completed but believes that in the interim, the preliminary data provide a basis for taking a precautionary approach. Accordingly, the Commission continues to believe that rather than simply reducing the size of the zones it plans to monitor, the Navy should supplement its visual monitoring efforts with other monitoring measures. The Navy proposed to supplement visual monitoring with passive acoustic monitoring during three explosive activity types but not during the other explosive activities or during low-, mid- and high-frequency active sonar activities. The Navy uses visual, passive acoustic, and active acoustic monitoring (via HF/M3) during SURTASS LFA sonar activities to augment its mitigation efforts over large areas. The Navy indicated in its Phase III DSEIS that it is not able to use HF/M3 during training and testing activities due to impacts on speed and maneuverability that can affect safety and mission requirements based on costs associated with designing, building, installing, maintaining, and manning the equipment.

The Navy also stated that it did not have sufficient resources to construct and maintain additional passive acoustic monitoring systems or platforms for each training and testing activity. The Commission again points out that sonobuoys, which are deployed and used during many of the Navy's activities, could be deployed and used without having to construct or maintain additional systems. For example, multiple sonobuoys could be deployed with the target prior to an activity to better determine whether the target area is clear and remains clear until the munition is launched[46]. The Navy went on to state that passive acoustic detections would not provide range or bearing to detected animals and therefore cannot be used to determine an animal's location or confirm its presence in a mitigation zone. The Commission does not agree with that supposition.

In the DSEIS, the Navy indicated that it had capabilities to monitor instrumented ranges in real time or through data recorded by hydrophones at the Southern California Offshore Range, the Pacific Missile Range Facility (PMRF) off Kauai, and the Atlantic Undersea Test and Evaluation Center in the Bahamas. The Commission also understands that the Navy is quite adept at detecting, classifying, and localizing individual marine mammals on those ranges[47]. For example, Helble et al. (2015) were able to track multiple animals on PMRF hydrophones in real time, including humpback whales, a species that can be problematic to localize. The positions of several animals were estimated

[45] Of humpback whales, rough-toothed dolphins, and unidentified large whales.
[46] Directional Frequency Analysis and Recording (DIFAR) sonobuoys can perform this function, as well as likely other types.
[47] Via the Marine Mammal Monitoring on Navy Ranges (M3R) program.

simultaneously with a localization error rate of 2 percent or less. Similar methods can be used for other species. Baird et al. (2015) also indicated that the PMRF hydrophones allow the PAM analyst to isolate animal vocalizations on the range, confirm species classification, and localize groups of animals in real time. Multiple detectors can be used for sperm whales, delphinids, beaked whales, and baleen whales. Similar to Helble et al. (2015), Baird et al. (2015) indicated that localization algorithms could determine an animal's position. In the case of bottlenose dolphins, localized positions were within approximately 100 m of the vocalizing animal. Similar localizations have been used to direct researchers to groups of vocalizing odontocetes to deploy satellite-linked tags (Baird et al. 2014). Moreover, the Navy itself has indicated the success of using sonobuoys to detect bottlenose dolphins in real-time during mine exercises and provides sonobuoys to researchers for the same purpose of detecting and localizing marine mammals.[48]

Although the Navy indicated that it was continuing to improve its capabilities for using range instrumentation to aid in the passive acoustic detection of marine mammals[49], it also stated that it did not have the capability or resources to monitor instrumented ranges in real time for the purpose of mitigation. That capability clearly exists. While available resources could be a limiting factor, the Commission notes that personnel who monitor hydrophones and sonobuoys on the operational side have the ability to monitor for marine mammals as well[50]. Department of the Navy (2013) confirmed that that ability exists—four independent sightings were made not by the Navy lookouts but by the passive acoustic technicians on board the ship. Similarly, Department of the Navy (2014c) reported that echolocation clicks of short-finned pilot whales were reported to the bridge by the sonar technician prior to mitigation being implemented. The Commission has supported the use of the instrumented ranges, operational hydrophones and active acoustic sources, and sonobuoys to fulfill mitigation implementation for quite some time and contends that localizing certain species (or genera) provides more effective mitigation than localizing none at all.

Given that the effectiveness of Navy lookouts conducting visual monitoring has yet to be assessed, the Commission believes that passive or active acoustic monitoring should be used to supplement visual monitoring, especially for activities that could injure or kill marine mammals. Therefore, the Commission again recommends that the Navy use passive and active acoustic monitoring, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that could cause injury or mortality beyond those explosive activities for which passive acoustic monitoring already was proposed—at the very least, sonobuoys that are expended and active sources and hydrophones that are used during an activity should be monitored for the presence of marine mammals.

Pre- and post-activity monitoring—Based on the limitations noted for implementing mitigation measures during explosive activities, the Commission believes additional pre- and post-activity monitoring should be required. Although the Navy may not be able to provide additional assets to clear an area prior to an activity, the existing assets (primarily aircraft[51]) could conduct additional flyovers of the

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[48] Which include DIFAR sonobuoys, routinely used by the Navy. http://navysustainability.dodlive.mil/files/2014/05/Spr14_Sonobuoys_Research_Monitoring.pdf

[49] The Navy has yet to address the Commission's recommendations to use sonobuoys to monitor for marine mammals—their use was not discussed in the response to comments in either the AFTT or HSTT final EIS.

[50] For example, the engineer monitoring the hydrophones during a U.S. Air Force (USAF) activity at PMRF also listened for any signs of marine mammal life post- [aerial clearance] survey and leading up to weapon impact (USAF 2016).

[51] Particularly in cases when aircraft routinely have extra fuel available, as some aircraft dump their fuel prior to landing.

mitigation zone before expending any ordnance. Therefore, the Commission recommends that the Navy conduct additional pre-activity overflights, barring any safety issues (e.g., low fuel), before conducting any activities involving detonations.

In addition, the Navy would conduct post-activity monitoring for certain, but not all, activities involving underwater detonations. Specifically, post-activity monitoring would not be required after activities involving medium- and large-caliber projectiles, missiles and rockets, or bombs. Based on the uncertain effectiveness of the Navy's proposed mitigation measures, the Commission believes it would be prudent to require post-activity monitoring for these activities as well. That monitoring could occur immediately after the activity, with additional surveys by activity aircraft as previously specified or by vessels or when personnel retrieve the targets. The Commission recommends that the Navy conduct post-activity monitoring for activities involving medium- and large-caliber projectiles, missiles, rockets, and bombs.

Level A harassment and mortality takes

The Navy used various post-model analyses to estimate the numbers of marine mammal takes during acoustic and explosive activities that are similar to methods used in its Phase II DEISs. Those analyses effectively reduced the model-estimated numbers of Level A harassment (i.e., PTS) and mortality takes. The analyses were based on (1) animal avoidance, (2) mitigation effectiveness, and (3) cut-off distances. The Commission has discussed the first two aspects at length in letters regarding Phase II activities. That information is not repeated herein but should be reviewed in conjunction with this letter (see the Commission's 15 September 2014 letter). The Commission has a few additional comments on those analyses.

For avoidance, the Navy assumed that animals present beyond the range to onset PTS for the first three to four pings would avoid any additional exposures at levels that could cause PTS (Department of the Navy 2018). That equated to approximately 5 percent of the total pings or 5 percent of the overall time active; therefore, 95 percent of marine mammals predicted to experience PTS due to sonar and other transducers were instead assumed to experience TTS (Department of the Navy 2018). The Navy should have been able to query the dosimeters of the animats to verify whether its 5-percent assumption was valid[52], but on its face that assumption has no scientific basis. Given that sound sources are moving, it may not be until later in an exercise that the animal is close enough to experience PTS and it is those few close pings that contribute to the potential to experience PTS. Since both sources and animals are moving during an exercise, whether an animal is initially beyond the PTS zone has no bearing on whether it will later come within close range. Behavioral response studies (BRS) have shown this as well. For example, Southall et al. (2014) indicated that Risso's dolphins and California sea lions approached the 200-m shut-down zone when a source[53] was operating at full power, resulting in having to shut down the source. Both instances occurred well after the first three or four pings. Department of the Navy (2010b and 2012) also noted multiple instances in which dolphins were observed 27 to 460 m from a vessel emitting mid-frequency active sonar, in some instances several hours after the source was active. Those dolphins

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[52] That is, whether the first three to four pings equated to 5 percent of the total pings *and* 5 percent of the overall time active, not whether the animals avoided the source since horizontal animal movement was not incorporated in the Navy's modeling.

[53] For both simulated and scaled sources. Similar results were observed with Risso's dolphins, California sea lions, and common dolphins during previous BRSs (Southall et al. 2011, 2012, 2013, and 2015).

did not receive only the first three or four pings emitted, nor did they avoid the source. Avoidance aside, Navy vessels may move faster than animals are capable of moving to evacuate the area, exposing such animals to pings after the first three or four as well.

Regarding mitigation effectiveness, the Commission notes that the specific mitigation effectiveness scores for the various activities were provided for Phase II but not for Phase III activities. For Phase III, the Navy included more detail regarding how the scores were determined (including species sightability, observation area extent, visibility factors, and whether sound sources were under positive control) but did not specify what the actual scores were for those four factors or as a whole. The Navy also did not include model-estimated numbers of takes. The lack of information makes it difficult for the Commission and the public to assess the appropriateness of the mitigation scores or their effect on the overall numbers of marine mammal takes. And, although the Navy did not reduce the numbers of injury (slight lung and GI tract) and PTS takes for explosive activities as it had for Phase II analyses, it still assumed its model-estimated mortality takes would not occur, zeroed out those takes, and enumerated them as injury takes. Since the Navy has yet to determine the effectiveness of its mitigation measures, it is premature to include *any* related assumptions to reduce the numbers of marine mammal takes.

The concerns with the cut-off distances, which reduced the numbers of takes, were provided in a previous section of this letter and it seems that, as a whole, the post-analyses would underestimate the various numbers of takes. Therefore, the Commission again recommends that the Navy (1) specify the total numbers of model-estimated Level A harassment (PTS) and mortality takes rather than reduce the estimated numbers of takes based on the Navy's post-model analyses and (2) include the model-estimated Level A harassment and mortality takes in its LOA application to inform NMFS's negligible impact determination analyses.

The Commission understands the effort that goes into drafting these documents and appreciates the Navy's response to some of its previous recommendations. Most, if not all, of the Commission's recommendations would apply to the Navy's LOA application as well and should be considered as such. Please contact me if you have questions concerning the Commission's recommendations or rationale.

Sincerely,

Peter O Thomas

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

cc: Jolie Harrison, NMFS

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