12 June 2020

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226

Dear Ms. Harrison:

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) 2 June 2020 notice (85 Fed. Reg. 33914) and the letter of authorization (LOA) application submitted by the U.S. Navy (the Navy) seeking the extension 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 Northwest Training and Testing (NWTT) study area (Phase III activities[1]) during a seven-year period. The Commission reviewed and provided recommendations in its 15 April 2019 letter on the Navy's Draft Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement (DSEIS) regarding conducting training and testing activities in the NWTT study area.

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, vessels, underwater vehicles, and aircraft. In addition to potential time-area closures, mitigation measures would include visual monitoring[2] to implement delay and shut-down procedures.

Density estimates

Uncertainty in density estimates—The Commission had recommended in previous letters regarding Navy Phase II activities that the Navy incorporate more refined data in its extrapolated density estimates, including for cetaceans in regions or seasons that have not been surveyed or for which data are scant. For Phase III activities in the Atlantic Fleet Training and Testing (AFTT) study area and

[1] NMFS authorized the Navy to conduct similar activities first under the Tactical Training Theater Assessment and Planning (TAP I) LOA applications and second under Phase II LOA applications.
[2] Passive acoustic monitoring would be required only for explosive sonobuoys and explosive torpedoes.

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[3] 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. Rather, 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).

Density data for its offshore and Western Behm Canal areas[4] are based on either interpolation from density data adjacent to or near the area or extrapolation from other areas[5], 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[6]. 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. The Commission recommends that NMFS clarify whether and how the Navy 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[7] to better refine its density estimates. The Navy did so for Phase III activities at NWTT and also included density estimates based on finer geographic[8] and seasonal scales[9]. The Commission *appreciates* that the Navy not only incorporated its

[3] 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.
[4] 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.
[5] 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.
[6] For example, Dall's porpoise density estimates in inland waters of Washington were scaled based on densities of harbor porpoises.
[7] i.e., the percentage of time at sea.
[8] 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.
[9] Estimates for some species were based on monthly rather than seasonal densities.

previous recommendations but also funded various monitoring activities, as well as, more sophisticated analyses to refine its pinniped density estimates in NWTT.

Nonetheless, the Commission has some concerns regarding the underlying abundance data that were used to estimate the various pinniped densities. These include—

- 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 and from St. Paul and St. George in 2016.
- The abundance estimate for Guadalupe fur seals was based on pup count data from 2008 and 2010 and did not include the more recent survey data from 2013–2015[10] and associated correction factors.
- The abundance estimate for Steller sea lions was based on pup and non-pup count and trend data from 2015 and did not incorporate the more recent trend data from 2017. The Navy also applied non-pup growth rates to the non-pup *and* pup abundance estimates rather than applying the non-pup growth rates to the non-pup abundances and the pup growth rates[11] to the pup abundances.

Some of the more recent data were included in NMFS's draft 2019 SARs[12]. Since NMFS used the draft 2019 SARs or the most recently finalized SAR for the abundance estimates used in its negligible impact determination analyses (see Tables 9 and 52–57 in the *Federal Register* notice), it also must use the most recent abundance estimates to inform the associated densities and resulting take estimates as those abundance estimates represent the best available science.

The Navy also adjusted some of the abundance estimates from 2015[13] based on relevant growth rates *up to* 2017 for Steller[14] and California sea lions[15], Guadalupe fur seals[15], harbor seals[16], and northern elephant seals[17]. 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—this is particularly puzzling since NMFS has adjusted the abundances based on the relevant growth rates through 2019 and 2020 for multiple incidental harassment authorizations involving geophysical surveys conducted in the same region (84 Fed. Reg. 35075 and 85 Fed. Reg. 19615, respectively). 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 incorrectly indicated that the region-specific, at-sea correction factor was 37 percent based on Huber et al. (2001) rather than 46 percent[18]. Therefore, the Commission recommends that NMFS (1) revise

[10] Pup counts from 2013 for Isla Guadalupe and counts of primarily juveniles and many fewer pups for Isla San Benito from 2014 and 2015.
[11] Which are greater than the non-pup growth rates.
[12] Some also originated from previous final SARs.
[13] 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).
[14] In the offshore, inland waters, and Western Behm Canal areas.
[15] In the offshore area.
[16] In the Western Behm Canal area.
[17] In the offshore and Western Behm Canal Areas.
[18] 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.

the various densities for (a) northern fur seals based on the abundance estimate that includes data from Bogoslof Island in 2015 and from St. Paul and St. George in 2016, (b) Guadalupe fur seals based on abundance data from 2013-2015 at both Isla Guadalupe and Isla San Benito and applying the relevant growth rates up to at least 2020, (c) Steller sea lions based on adjusting the 2015 pup and non-pup data using the trend data from 2017, applying the non-pup growth rate to the non-pup counts and the pup growth rates to the pup counts, and applying the relevant growth rates up to at least 2020, (d) California sea lions, harbor seals, and elephant seals based on applying the relevant growth rates up to at least 2020, and (e) harbor seals in the Strait of Juan de Fuca and the San Juan Islands based on assuming that 46 percent of the animals would be in the water at a given time from Huber et al. (2001) and (2) re-estimate the numbers of takes accordingly in the final rule.

Lack of transparency in cetacean density estimates for Western Behm Canal—As noted in previous letters, the Commission had difficulty determining how some of the densities were estimated for Western Behm Canal. For example, the Navy indicated that various cetacean densities[19] 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 did not explain the method by which the densities were calculated nor did 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 contends that the same level of information should have been provided for certain cetacean densities in Western Behm Canal as was provided for the other areas for NWTT. Therefore, the Commission recommends that NMFS require the Navy to provide the method(s) by which species-specific cetacean densities were calculated for Western Behm Canal and cite the primary literature from which those data originated in Department of the Navy (2019). That level of information should be provided in all technical reports that underpin the Navy's density databases for future Phase III and IV DSEISs, DEISs, and proposed rules.

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 2018), 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 2017b). Although several more recent studies provide additional information on behavioral audiograms (Branstetter et al. 2017, Kastelein et al. 2017b) and TTS (Kastelein et al. 2017a and c, Popov et al. 2017, Kastelein et al. 2018a and 2019b, c, and d)[20] to assess the validity of the weighting functions and associated thresholds, only Branstetter et al. (2017) was discussed in the LOA application. NMFS did not discuss any of the new studies in the preamble to the proposed rule. The Commission appreciates that developing weighting functions and associated thresholds is an extensive process[21] and that the Navy cannot amend them with each new published dataset. However, the agencies should have specified whether those newer data corroborate the current

[19] Except harbor and Dall's porpoises.
[20] However, more recent data regarding behavioral responses from Kastelein et al. (2018b and 2019a) were discussed.
[21] More so than amending point density estimates.

weighting functions and associated thresholds. The Commission recommends that NMFS specify in the preamble to the final rule whether the data regarding behavioral audiograms (Branstetter et al. 2017, Kastelein et al. 2017b) and TTS (Kastelein et al. 2017a and c, Popov et al. 2017, Kastelein et al. 2018a and 2019b, c, and d) support the continued use of the current weighting functions and PTS and TTS thresholds.

Behavior thresholds for non-impulsive sources—To further define its behavior thresholds for non-impulsive sources[22], the Navy developed multiple[23] Bayesian biphasic dose response functions[24] (Bayesian BRFs) for Phase III activities. The Bayesian BRFs were a generalization of the monophasic functions previously developed[25] and applied to behavioral response data[26] (see Department of the Navy 2017b for specifics). The biphasic portions of the functions are intended to describe both level- and context-based responses as proposed in Ellison et al. (2011). 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[27]. The Commission agrees that the Bayesian BRFs are reasonable and a much-needed improvement on the two dose response functions (BRFs)[28] that the Navy had used for both 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 2017b). The Navy indicated it was likely that the context of the exposure is more important than the amplitude at large distances[29] (Department of the Navy 2017b)—that is, the context-based response dominates the level-based response. The Commission agrees with that notion but notes that the Bayesian BRFs specifically incorporate those factors. Thus, including additional cut-off distances *contradicts* the data underlying the Bayesian BRFs, *negates* the intent of the functions themselves, and *underestimates* the numbers of takes.

The actual cut-off distances used by the Navy also appear to be unsubstantiated. For example, the Navy indicated that data were not available regarding the response distances of harbor porpoises to sonar or other transducers, so it based the cut-off distances on harbor porpoise responses to pile-driving activities. The Commission disagrees with that choice, given that pile-driving activities are an impulsive rather than non-impulsive source and unrelated to the Bayesian BRFs. For pinnipeds, the Navy indicated there are limited data on pinniped behavioral responses in

[22] Acoustic sources (i.e., sonars and other transducers).
[23] 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.
[24] 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.
[25] By Antunes et al. (2014) and Miller et al. (2014).
[26] From both wild and captive animals.
[27] e.g., the animal's previous experience, separation distance between sound source and animal, and behavioral state including feeding, traveling, etc.
[28] One for odontocetes and pinnipeds and one for mysticetes.
[29] 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).

general, and a total lack of data beyond 3 km from the source. However, the Navy arbitrarily set the cut-off distance at 5 and 10 km depending on the source. In response to the Commission's comments regarding those cut-off distances, the Navy indicated that pinnipeds do not exhibit strong reactions to sound pressure levels up to 140 dB re 1 μPa based on Southall et al. (2007; 83 Fed. Reg. 65230). The Commission notes, as did the Navy, that data from Southall et al. (2007) were limited, were based on sources that did not have characteristics similar to mid-frequency active (MFA) sonar[30], and did not include exposures at higher received levels. Data on pinniped behavioral responses now exist for both sound sources similar to MFA sonar and at higher received levels. Those data ultimately were used by the Navy to develop the Bayesian BRF for pinnipeds (see Table 3-2 in Department of the Navy 2017b for specifics), while none of the data cited in Southall et al. (2007) were used. Some of the pinnipeds did in fact exhibit 'strong' reactions based on the Southall et al. (2007) severity scale[31] to received levels less than and equal to 140 dB re 1 μPa, and those data were used to inform the context portion of the Bayesian BRF.

For other cetaceans, the Navy based the cut-off distances 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 MFA 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 MFA sonars), the estimated numbers of takes would be reduced to zero for odontocetes beginning where the probability of response is 25 percent (Table 6-11 in the LOA application). 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 (see Figure 3 in Goldbogen et al. 2013[32]). The Navy attempted to assuage the Commission's concerns[33] in its response to comments regarding the AFTT DEIS[34] 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. The Commission disagrees. Use of the cut-off distances is neither conservative nor realistic and

[30] Some sources emitted sound at much lower frequencies (the acoustic thermometry of the ocean climate (ATOC) sound source emitted signals at a center frequency of 75 Hz) and at a greater repetition rate than MFA sonar (Costa et al. 2003). Other sources emitted sound at higher frequencies (the Airmar™ acoustic harassment device (AHD) emitted signals at 10 kHz or higher and acoustic communication signals were emitted at 12 kHz with higher frequency harmonics) and at a greater repetition rate with shorter pulse durations (specifically the AHD) than MFA sonar (Jacobs and Terhune 2002, Kastelein et al. 2006).
[31] Equating to significant behavioral responses as specified by the Navy.
[32] Data that also were used to derive the Bayesian BRFs.
[33] See its 2 August 2017 letter on AFTT.
[34] Which NMFS also included in the preamble to the final rule (83 Fed. Reg. 57112).

effectively discounts the underlying data, including Goldbogen et al. (2013), upon which the BRFs are based.

Tyack and Thomas (2019) recently compared results between setting a threshold where 50 percent of the animals respond and using the actual Bayesian BRF—setting the threshold at a 50-percent response led to an underestimation of effect by greater than two orders of magnitude[35]. Although the arbitrary cut-off distance in the Navy's example occurred where up to 45 percent of the animals respond, the behavioral impacts and takes of the various species have been underestimated as well. As noted by Tyack and Thomas (2019), given the shape of the dose-response function and how efficiently sound propagates in the ocean, the number of animals that are predicted to have a low probability of response may in fact represent the dominant impact from a given sound source. For all these reasons, the Commission strongly 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. 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[36] (Schlundt et al. 2000). Basing an impulsive threshold on responses of dolphins to a non-impulsive source 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 2017b)[37]. The Navy has asserted that the most likely behavioral response would be a brief alerting or orienting response and significant behavioral 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 such data, there is no reason to continue to ascribe validity to assumptions made 10 to 20 years ago. Larger single detonations (such as explosive torpedo testing[38]) would be expected to elicit 'significant behavioral responses'[39]. The Navy provided no evidence regarding why 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[40], 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

[35] By a factor of 280.
[36] Based on 1-sec tones.
[37] Including certain gunnery exercises that involve several detonations of small munitions within a few seconds.
[38] With net explosive weights of 500 to 650 lbs (Bin E11 in Table 1-8 in the LOA application).
[39] 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 (2017b) and used by the Navy to differentiate behavioral response severity.
[40] See its November 13 2017 letter on HSTT.

never, as far as the Commission is aware, stationed personnel at the target site to monitor marine mammal responses during large single detonations. For other activities (i.e., missiles launched from a ship), the target area isn't cleared prior to the exercise and personnel are 28 to 139 km from the target site (see section 5.3.3.4 of the DSEIS). 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 observes 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, but rather are responsible for minimizing serious injury to and mortality of any observed animal. Additionally, the Navy was not required to conduct post-activity monitoring for any of its activities under the NWTT Phase II final rule (50 C.F.R. § 218.144)[41] and post-activity monitoring is conducted primarily to document injured and dead marine mammals[42], not behavioral responses. The Commission maintains that the Navy, and in turn NMFS, has not provided adequate justification for ignoring the possibility that single underwater detonations can cause a behavioral response and therefore again recommends that NMFS estimate and ultimately authorize 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[43] 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 when the underlying data[44] have remained the same. The modifications yield smaller zones[45] in some instances and larger zones in other instances[46]. These results are counterintuitive since the Navy presumably amended the impulse metrics to account for 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 specify the assumptions made in either final EIS. The Navy merely directed the Commission to Department of the Navy (2017b)—the document from which the Commission's comments originated. NMFS also did not provide additional information to address the Commission's similar comments on the AFTT and HSTT proposed rules (83 Fed. Reg. 57113 and 66879, respectively). Therefore, the Commission recommends that NMFS (1) explain why, if the constants and exponents for onset mortality and onset slight lung injury thresholds[47] for Phase III have been amended to account for lung compression with depth, they result in lower rather than higher absolute thresholds when animals occur at depths greater than 8 m and (2) specify what additional assumptions were made to explain this counterintuitive result.

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[41] The preamble to the Phase II proposed rule indicated that post-activity monitoring would be required to be conducted after mine countermeasures and neutralization activities (80 Fed. Reg. 31775). However, neither the proposed rule nor the final rule included that requirement.
[42] Similar to those measures included in section 218.94 of the proposed rule.
[43] The constants have increased and the exponents have decreased from 1/2 to 1/6.
[44] Based on Richmond et al. (1973), Yelverton et al. (1973), Yelverton and Richmond (1981), and Goertner (1982).
[45] When animals occur at depths between the surface and 8 m, yielding higher absolute thresholds.
[46] When animals occur at depths greater than 8 m, yielding lower absolute thresholds.
[47] Equations 11 and 12 in Department of the Navy (2017b).

More importantly, the Navy used the onset[48] mortality and onset slight lung injury criteria to determine only the range to effects[49], while it used the 50 percent mortality and 50 percent slight lung injury criteria to estimate the numbers of marine mammal takes[50]. 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[51] 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[52] is a level of injury that would result in mortality for a wild animal (Department of the Navy 2017b). Thus, it is unclear why the Navy did not estimate the numbers of takes based on onset rather than the 50-percent criterion.

What is clear is that the 50-percent rather than onset criteria underestimate both predicted mortalities and injuries. The Navy's response in the AFTT and HSTT final EISs, and by default NMFS's response in the AFTT and HSTT final rules (83 Fed. Reg. 57113 and 66879, respectively), that overpredicting impacts by using onset values would not afford extra protection to any animal[53] is irrelevant from an impact analysis standpoint. The intent of an impact analysis is to estimate and evaluate 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 must be fully accounted for rather than erroneously discounted in any impact analysis. The Commission again recommends that NMFS use onset mortality, onset slight lung injury, and onset GI tract injury thresholds rather than the 50-percent thresholds to estimate both the numbers of marine mammal takes *and* the respective ranges to effect. If NMFS does not implement the Commission's recommendation, the Commission further recommends that NMFS (1) specify why it is inconsistently basing its explosive thresholds for Level A harassment on onset PTS and Level B harassment on onset TTS and onset behavioral response, while the explosive thresholds for mortality and Level A harassment are based on the 50-percent criteria for mortality, slight lung injury, and GI tract injury, (2) provide scientific justification supporting the assumption that slight lung and GI tract injuries are less severe than PTS and thus the 50-percent rather than onset criteria are more appropriate for estimating Level A harassment for those types of injuries, and (3) justify why the number of estimated mortalities should be predicated on at least 50 percent rather than 1 percent of the animals dying. As noted in the following section, many of the mitigation zones are not sufficient to protect the various functional hearing groups—thus an argument by NMFS that the mitigation zones for mortality and slight lung and GI tract injuries are more conservative and will protect marine mammals because they have been based on onset criteria is unsupported. Further

[48] Defined as the 1-percent risk in the HSTT FEIS.
[49] To inform the mitigation zones.
[50] A similar approach was taken for gastrointestinal (GI) tract injuries.
[51] Which is discussed further herein.
[52] i.e., onset mortality; see Table 4-1 in Department of the Navy (2017b).
[53] And yet the mitigation zones are based on the onset values, so the animals would in fact be afforded 'extra protection'.

complicating this issue is the fact that the effectiveness of the various mitigation measures has yet to be proven. Thus, espousing the presumed effectiveness of those measures is unfounded.

Mitigation measures

Mitigation areas—The Navy identified six proposed geographic mitigation areas based on public comments received on the DSEIS, the best available science, and the practicability of implementing additional mitigation measures (85 Fed. Reg. 34000). The Navy incorporated the majority of the potential mitigation areas that would minimize impacts on marine mammals that were identified in Appendix K of the DSEIS. However, neither the Navy nor NMFS specified why some of the potential mitigation areas were not proposed for inclusion.

For humpback whales, the Navy proposed to include humpback whale mitigation areas that encompass two of the three feeding biologically important areas (BIAs) in the NWTT offshore area. The Navy mentioned the Northern Washington Humpback Whale Feeding Area[54] as a potential mitigation area in Appendix K of the DSEIS but did not specify why it was not included as a proposed mitigation area[55]. The area is well within the NWTT offshore area (Figure K-1 in Appendix K of the DSEIS) and overlaps with the same timeframe as the Stonewall and Heceta Bank Humpback Whale Mitigation Area. Thus, it is unclear whether the Navy determined that limiting activities, particularly mine countermeasure and neutralization testing activities and MF1 sonar use[56], was not practicable or whether the Navy had some other rationale for not including the area as a proposed mitigation area similar to the other humpback whale mitigation areas. The Navy similarly mentioned the Northwest Washington Gray Whale Feeding Area[57] as a potential mitigation area for gray whales but did not specify why it was not included as a proposed mitigation area, particularly for the portion that is within the NWTT offshore area[58].

The Navy's approach for those areas is in contrast to its approach for the Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar DSEIS. The Navy included all relevant information for both the areas that it proposed to include and those it did not. The Navy's currently proposed approach also is in contrast to its approach for numerous suggested mitigation areas that were provided in other DSEIS (see section I.4 in Appendix I of the DSEIS for the Mariana Islands Training and Testing study area entitled *Geographic mitigation assessment–Areas not carried forward for implementation*). The Navy should have included the same level of information for the NWTT DSEIS, and NMFS should have explained, at a minimum, why it chose not to include mitigation areas for those BIAs mentioned in the preamble. Absent sufficient information warranting their exclusion, the two areas should have been included as proposed mitigation areas if practicable to implement to ensure that the Navy is effecting the least practicable adverse impact on the species or stocks. The Commission recommends that NMFS (1) require the Navy to determine

[54] Which was based on the Northern Washington feeding BIA (May–November) delineated in Calambokidis et al. (2015).
[55] NMFS also mentioned this BIA in the preamble but did not specify why it was not included as a proposed mitigation area (85 Fed. Reg. 33932 and 34023).
[56] Which would be prohibited in the two other humpback whale mitigation areas.
[57] Which was based on the Northwestern Washington feeding BIA (May–November) delineated in Calambokidis et al. 2015.
[58] NMFS mentioned this BIA in the preamble to the final rule but similarly did not specify why it was not included as a proposed mitigation area (85 Fed. Reg. 33932).

whether it would be practicable to implement both the Northern Washington Humpback Whale Feeding Area and the portion of the Northwest Washington Gray Whale Feeding Area that is within the NWTT offshore area as mitigation areas that limit MF sonar and explosive training and testing activities from May–November, consistent with the Humpback Whale Mitigation Areas proposed to be included and (2) if it is practicable, include the areas as mitigation areas in the final rule or, if it is not practicable, justify why the areas were not included as mitigation areas in the preamble to the final rule.

In addition, in the preamble to the proposed rule, NMFS acknowledged the proposed rule revising critical habitat for Southern Resident killer whales (SRKWs). Some portions of the proposed revised critical habitat that fall in the offshore and inland water areas of NWTT were proposed to be excluded based on impacts on national security (84 Fed. Reg. 49234-49235). Critical habitat is defined in section 3(5)(A) of the Endangered Species Act as the—

> (1) specific areas within the geographical area occupied by the species at the time it is listed, on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection and (2) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary of Commerce that such areas are essential for the conservation of the species.

Based on the currently-recognized BIAs[59] in the U.S. exclusive economic zone, critical habitat delineations have been subsumed by the BIA delineations for those species for which both critical habitat and BIAs have been designated (Calambokidis et al. 2015, Ferguson et al. 2015a and b, LaBrecque et al. 2015), except for the Main Hawaiian Islands (MHI) insular false killer whale (Baird et al. 2015a). Both critical habitat and BIAs represent important areas for the species or stocks they are intended to protect and should be considered as mitigation areas when applicable. Since the Navy has already requested that portions of the NWTT study area be excluded from the proposed revised SRKW critical habitat areas for national security purposes, the remaining critical habitat areas should be included as a proposed mitigation area(s) in the final rule if practicable to implement to ensure that the Navy is effecting the least practicable adverse impact on SRKWs, a critically endangered stock. The Commission recommends that NMFS (1) require the Navy to determine whether it would be practicable to implement the proposed revised SRKW critical habitat areas, as depicted in the associated proposed rule (50 C.F.R. § 226.206(d)) and that fall within the NWTT study area but are *not* proposed to be excluded for national security purposes in section 226.206(c) of the proposed rule, as a mitigation area(s) that limits MF sonar and explosive training and testing activities and (2) if it is practicable, include the areas as a mitigation area(s) in the final rule or, if it is not practicable, justify why the areas were not included as a mitigation area(s) in the preamble to the final rule. If the mitigation area(s) is included in the final rule, the Commission further recommends that NMFS expand the mitigation area(s) as necessary if new information is made available (e.g., the proposed revised critical habitat is expanded in an associated final rule and the expanded area(s) overlaps the NWTT study area) during the timeframe under which the final rule would be valid.

[59] Which currently only apply to cetaceans.

Mitigation effectiveness—The Navy's proposed mitigation zones are similar to the zones[60] 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 several functional hearing groups[61] from PTS. For example, the mitigation zone for an explosive sonobuoy[62] is 549 m (Table 38, 85 Fed. Reg. 33993), but the mean PTS zones range from 2,030–2,229 m for HF cetaceans[63]. Similarly, the mitigation zone for an explosive torpedo[64] is 1,920 m (Table 31, 85 Fed. Reg. 5853), but the mean PTS zones range from 13,555–16,639 m for HF cetaceans[65]. 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. 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 observing 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) and animal behavior (e.g., the amount of time an animal spends at the surface of the water). The Commission agrees and has made repeated recommendations to the Navy regarding the 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[66]. The Navy has been conducting those studies for more than a decade but on a scale and in a manner that apparently has been insufficient to provide useful results The most recent lookout effectiveness report posted on the Navy's monitoring website is from four years ago (Department of the Navy 2016). Based on the Navy's monitoring website it has allocated only $40K to $60K to the effort for the period from 2010 to 2019, while other projects range from 100s of thousands to $1.4M over shorter timeframes[67]. Moreover, many of the lookout effectiveness cruises have occurred in areas where few marine mammals are present, which only delays data analyses further. As such, the Commission recommends that NMFS require the Navy to (1) allocate additional resources to the lookout effectiveness study, (2) consult with the University of St. Andrews to

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[60] 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.

[61] This routinely occurs for high-frequency (HF) cetaceans within NWTT, as well as for low-frequency (LF) cetaceans and phocids.

[62] Bin E3 in Table 1-8 of the LOA application.

[63] The maximum range extends to 6,025 m for HF cetaceans (Table 6-47 in the LOA application). See Table 6-55 for phocids as well.

[64] Bin E11 in Table 1-8 of the LOA application.

[65] The maximum ranges extend to 49,275 m for HF cetaceans (Table 6-47 in the LOA application). See Table 6-49 for LF cetaceans and Table 6-55 for phocids as well.

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

[67] The funding amount was only reported for Hawaii. It has not been reported for Southern California, where very few lookout cruises have occurred (https://www.navymarinespeciesmonitoring.us/regions/).

determine how much additional data are necessary to analyze the data in a statistically meaningful manner, and (3) develop a plan to maximize the number of sightings (e.g., conducting cruises in Southern California rather than Hawaii) and complete the study as soon as possible.

The current data, while not sufficient for statistical analysis, are still useful. 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 MFA 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 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 of 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[68] occurred at or within 1 km of the vessel, and Navy lookouts detected only 4 of 13 total sightings.

The Commission continues to assert that a precautionary approach should be taken until such time that sufficient data are available and that the Navy should supplement its visual monitoring measures with other monitoring measures rather than simply reducing the size of the zones it plans to monitor. 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)[69] 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. 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, as Directional Frequency Analysis and Recording (DIFAR) sonobuoys[70] can perform both functions and are routinely used by the Navy.

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[68] Of humpback whales, rough-toothed dolphins, and unidentified large whales.
[69] Similar to a fish-finding sonar as described by the Navy.
[70] As well as likely other types.

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[71]. 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 simultaneously with a localization error rate of 2 percent or less. Similar methods can be used for other species. Baird et al. (2015b) 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. (2015b) 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 drawn attention to 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.[72]

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, 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 the hydrophones and sonobuoys on the operational side do have the ability to monitor for marine mammals as well[73]. Department of the Navy (2013) confirmed that ability exists—four independent sightings were made not by the Navy lookouts but by the passive acoustic technicians. 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. And, although aircraft may not have passive or active acoustic capabilities, the aircraft carriers or other vessels from which the aircraft originated very likely do have such capabilities. The Commission has supported the use of the instrumented ranges, operational hydrophones and active acoustic sources[74], and sonobuoys[75] to fulfill mitigation implementation for quite some time and contends that localizing certain species (or genera) acoustically provides more effective mitigation than localizing none at all.

Given that the effectiveness of Navy lookouts conducting visual monitoring has yet to be determined, the Commission contends that passive[75] or active acoustic[74] monitoring should be used to supplement visual monitoring, especially for activities that could injure or kill marine mammals. Therefore, the Commission again recommends that NMFS require the Navy to use passive (i.e., DIFAR and other types of sonobuoys) and active acoustic (i.e., tactical sonars that are in use during

[71] Via the Marine Mammal Monitoring on Navy Ranges (M3R) program.
[72] Including DIFAR sonobuoys.
http://navysustainability.dodlive.mil/files/2014/05/Spr14_Sonobuoys_Research_Monitoring.pdf
[73] 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).
[74] Including tactical sonars that are used during the actual activity and other sources similar to fish-finding sonars.
[75] Including DIFAR and other types of sonobuoys.

the actual activity or other sources similar to fish-finding sonars) 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 deployed and active sources and hydrophones used during an activity should be monitored for marine mammals.

Least practicable adverse impact standard

The Commission has commented multiple 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[76]. However, NMFS 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). For example, the Commission previously indicated that, under the least practicable adverse impact requirement, and more generally under the purposes and policies of the MMPA, Congress embraced a policy that minimizes, whenever it is practicable, the risk of killing or seriously injuring a marine mammal incidental to an activity subject to section 101(a)(5)(A), by including measures in an authorization to eliminate or reduce the likelihood of lethal taking. Accordingly, the Commission had recommended that NMFS address this point explicitly in its least practicable adverse impact analysis and clarify whether it agrees that the incidental serious injury or death of a marine mammal always should be considered an adverse impact for purposes of applying the least practicable adverse impact standard. In the preamble to the AFTT final rule, NMFS indicated that it was unnecessary or unhelpful to address explicitly the point made by the Commission that an incidental death or serious injury of a marine mammal should always be considered an adverse impact on the species or stock (83 Fed. Reg. 57117). The Commission disagrees.

The Commission does not see how NMFS can meet the mandate of the MMPA to reduce adverse impacts to the lowest level practicable if it does not first identify clearly which impacts are adverse and may require mitigation under section 101(a)(5)(A)(i)(II)(aa). The Commission appreciates NMFS's statement that it has adopted a practice to mitigate mortality to the greatest degree possible, but disagrees with the agency's conclusions that one mortality does not affect the population in a quantifiable or meaningful way. Clearly, each mortality is quantifiable—it increases human-caused mortality by one and reduces the population size by one (plus the lost reproductive potential of that individual). The Commission agrees that the loss of a single individual may not be meaningful at the population level, but that is relevant for making a negligible impact determination, not for applying the least practicable adverse impact standard. Under the statutory scheme, before the least practicable adverse impact standard is applied, NMFS already will have determined that the anticipated taking will have a negligible impact. However, the MMPA requires NMFS to go beyond that and reduce any adverse impacts to the greatest extent practicable, even though population-level impacts are not significant.

NMFS stated that it does not understand the problem the Commission's recommendation is aimed at addressing and that following it "would confuse the issue" (83 Fed. Reg. 57117). Rather than adding confusion, the Commission was attempting to alleviate the confusion caused by NMFS's analytical approach, which, as noted previously, tends to co-mingle the negligible impact

[76] For example, see the Commission's 30 May 2017, 16 April 2018, 13 July 2018, and 21 August 2019 letters regarding this matter.

and least practicable adverse impact standards. As such, the Commission continues to recommend that NMFS clearly separate its application of the least practicable adverse impact requirement from its negligible impact determination. Once NMFS determines that an applicant's proposed activities would have a negligible impact, it still has a responsibility to determine whether the activities would nevertheless have adverse impacts on marine mammal species and stocks and their habitat. If so, NMFS must condition the authorization to eliminate or reduce those impacts whenever, and to the greatest extent, practicable. As the statute is written, it is inappropriate to conflate the two standards, as NMFS seems to be doing.

The Commission's goal in continuing to make this recommendation is to compel NMFS to clarify how it is making the required determinations under the MMPA. Specifically, the Commission is recommending the adoption of a process that tracks the provisions of the MMPA, separates the different determinations that NMFS must make, and is clear and transparent. The fact that NMFS's practice is "always…to mitigate mortality to the greatest extent possible…" indicates that, at the "gut level," it agrees with the Commission that a mortality always has an adverse impact. The Commission wants NMFS to acknowledge this within the statutory context. The Commission recommends that NMFS follow an analysis consisting of three elements to (1) determine whether the impacts of the proposed activities are negligible at the species or stock level, (2) if so, determine whether some of those impacts nevertheless are adverse either to marine mammal species or stocks or to key marine mammal habitat, and (3) if so, determine whether it is practicable for the applicant to reduce or eliminate those impacts through modifying those activities or by other means (e.g., requiring additional mitigation measures to be implemented).

Regarding previous Commission recommendations that NMFS address the habitat component of the least practicable adverse impact standard in greater detail, the Commission was attempting to emphasize that the standard has two components, one directed to species and stocks and one to marine mammal habitat. The Commission was not suggesting that there is no link between the two, but rather that NMFS 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. In applying the least practicable adverse impact requirement as it pertains to habitat, NMFS should consider first whether there are any potentially adverse impacts on key marine mammal habitat. If so, NMFS then should determine whether measures can be implemented to lessen or avoid those impacts and whether it is practicable for the applicant to implement them. Contrary to NMFS's characterization, the Commission was not suggesting that "NMFS must always consider separate measures aimed at marine mammal habitat" (83 Fed. Reg. 57117). As such, the Commission recommends that NMFS (1) 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 (2) always consider whether there are potentially adverse impacts on marine mammal habitat and whether it is practicable to minimize them. The MMPA requires that NMFS address both types of impacts, not that there be no overlap between the mitigation measures designed to reduce those impacts.

NMFS's response to the Commission's previous recommendation is troubling in another important aspect. NMFS asserted that it had "clearly identified measures that provide *significant* reduction of impacts to both 'marine mammal species and stocks and their habitat' (emphasis added)" (83 Fed. Reg. 57117). While perhaps true, "significant" reduction is not the statutory legal standard in applying the least practicable adverse impact standard. Section 101(a)(5)(A)(i)(II)(aa) of

the MMPA requires that any adverse impacts be reduced to the lowest level practicable. The Commission is advocating only that NMFS implement the statutory provision as written.

There are several reasons why an applicant would propose or NMFS would require that habitat protection measures be implemented as part of an incidental take authorization. Excluding or limiting activities in key habitat may be necessary to reduce the impacts of anticipated taking to a negligible level. Such measures also may be necessary to meet the MMPA's "small numbers" requirement, for activities other than military readiness. In addition, measures could be implemented solely to satisfy the least practicable adverse impact requirement. The Commission is advocating that NMFS provide a clear discussion of the rationale behind and justification for such measures. Regarding the Commission's recommendation for the AFTT proposed rule, the Commission was informing NMFS that it did not include any discussion of habitat protection measures in the least practicable adverse impact section of the proposed rule. The Commission continues to believe that a separate examination of habitat protection measures specifically linked to the least practicable adverse impact requirements is the best way for NMFS to demonstrate that it has thoroughly considered how the applicant's proposed activities might adversely affect marine mammal habitat and that it has adopted all practicable measures to reduce or eliminate such impacts.

In response to the Commission's previous recommendation to separate the analysis of impacts from the evaluation of the effectiveness of proposed mitigation measures in applying the least practicable adverse impact standard, NMFS misconstrued the Commission's intent (83 Fed. Reg. 57117). The Commission intended to emphasize that the effectiveness of mitigation measures is not relevant when determining whether the potential impacts of proposed activities on marine mammals and their habitat are or may be adverse. The effectiveness of any adopted measures could be considered to be a separate, implied criterion under section 101(a)(5)(A)(i)(II)(aa). However, as the Commission previously stated, the linkage of "effecting" with "least practicable adverse impact" in the statutory provision also could be addressed by considering effectiveness to be one element of practicability. That is, a mitigation measure should be considered practicable in reducing impacts only if it is expected to be effective. As such, the Commission again recommends that NMFS 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.

Although NMFS has written extensively on the least practicable adverse impact standard, it remains unclear to the Commission exactly how each authorization's proposed "mitigation measures are sufficient to meet the statutory legal standard," or even what standard NMFS is using. As such, the Commission again recommends that NMFS address these shortcomings by adopting a simple, two-step analysis that more closely tracks the statutory provisions being implemented. As noted previously, the first step should be to identify impacts on marine mammal species or stocks or their habitat that, although negligible, are nevertheless adverse. If such impacts are identified, then NMFS must identify and require the applicant to adopt measures to reduce those impacts to the lowest level practicable. If NMFS is using some other legal standard to implement the least practicable adverse impact requirements, the Commission further recommends that NMFS provide a clear and concise description of that standard and explain why it believes it to be "sufficient" to meet the statutory legal requirements.

Furthermore, since NMFS has expounded on the least practicable adverse impact standard at some length in a series of proposed authorizations, it has been an evolving process that varies depending on each specific situation. The Commission continues to recommend that NMFS adopt general regulations to govern the process and set forth the basic steps and criteria that apply across least practicable adverse impact determinations. Those standards should not be shifting on a case-by-case basis, as now appears to be the case. Rather, the analytical framework and decision-making standards should be consistent across authorizations. Variations between authorizations should be based on the facts underlying each application, not the criteria that underpin the least practicable adverse impact standard.

Level A harassment and mortality takes

Post-model analyses—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 17 June 2015 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[77], 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 the source 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[78] 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 unidentified dolphins and rough-toothed dolphins were observed 30 to 473 m from a vessel emitting mid-frequency active sonar, some instances were apparently numerous hours after the source was active. Those dolphins did not receive only the first three or four pings emitted, nor did they avoid the source. Avoidance aside, Navy vessels may move faster

[77] 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.
[78] 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).

than animals are capable of moving to evacuate the area, in which case the animals would be exposed to pings after the first three or four as well.

In its response to the Commission's comments on the AFTT and HSTT proposed rules, NMFS indicated that the current best available science based on a growing body of behavioral response research shows that animals do in fact avoid the immediate area around sound sources to a distance of a few hundred meters or more depending upon the species (83 Fed. Reg. 57114 and 66880, respectively). That assertion directly contradicts data noted herein for Risso's dolphins, California sea lions, rough-toothed dolphins, common dolphins, and unidentified dolphins (Department of the Navy 2010b and 2012, Southall et al. 2011, 2012, 2013, and 2015). NMFS also noted the limited extents of the harassment zones for PTS, ranging from 10s of meters to a maximum of 270 m (83 Fed. Reg. 57114 and 66880). NMFS however did not discuss the fact that those zones are based on a presumed 30-sec exposure time (see Table 19 in the preamble for the NWTT proposed rule). The presumed 30-sec exposure time was based on the maximum amount of time a marine mammal would realistically be exposed to levels that could cause the onset of PTS based on both platform (e.g., vessel) speed and a nominal animal swim speed of approximately 1.5 m/sec (83 Fed. Reg. 57162 and 66928). That nominal swim speed is underestimated. Swim speeds compiled by the Navy for its SURTASS LFA sonar ranged from 0.3 to 8.3 m/sec FSEIS (see Table B-2, Department of the Navy 2017a). Thus, swim speeds of certain species, particularly odontocetes and otariids, would be underrepresented with a nominal swim speed of 1.5 m/sec, resulting in underestimated exposure times and Level A harassment zones for PTS. In short, NMFS's responses regarding why avoidance should be incorporated are unsubstantiated.

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 the mitigation scores as a whole. The Navy also apparently 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.

Similarly, in its response to the Commission's comments on the AFTT and HSTT proposed rules, NMFS indicated that the "credit taken for mitigation effectiveness" was extremely conservative (83 Fed. Reg. 57114 and 66880, respectively). For example, if lookouts could see the whole area, they received credit for it in the Navy's calculation. If they could see more than half the area, they received half credit and they received no credit if they could see less than half the area (83 Fed. Reg. 57114 and 66880). It is unclear whether NMFS's characterization of the Navy's analyses means that lookouts that could *see* the whole area were assumed to be 100 percent effective or some other percentage. In Phase II analyses, the type of platform and species sightability also factored into whether mitigation was effective, which does not appear to be the case in this instance. More concerning is the fact that being able to *see* an area is not equivalent to whether lookouts can *detect*

marine mammals. As noted herein, there are numerous instances in which Navy lookouts have been unable to detect animals at distances ranging from 383 m to 1 km (Department of the Navy 2012, 2014a, 2014b, 2014c, 2016)—ranges which a lookout could *see*, since the MMOs had unobstructed views when observing all associated sightings. On its face, reducing numbers of takes based on mitigation effectiveness is unfounded and not based on best available science. This conclusion is further substantiated by NMFS's statement that it is not necessary to view the many tables of numbers generated in the assessment to evaluate the method (83 Fed. Reg. 57114 and 66881). This notion is patently false and further undermines the transparency of the process.

The Commission's concerns with the cut-off distances, which reduced the numbers of takes, were articulated in a previous section of this letter. When those distances are considered along with the post-analyses as a whole, it is clear that the various types and numbers of takes have been underestimated and that the analyses have not been informed by the best available science. Therefore, the Commission again recommends that NMFS (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, (2) include the model-estimated Level A harassment and mortality takes in its negligible impact determination analyses, and (3) authorize the model-estimated Level A harassment and mortality takes if the respective negligible impact determinations are able to be made and, if not, require the Navy to implement additional measures to mitigate such takes.

Negligible impact determination

NMFS applied both qualitative and quantitative analyses to inform its negligible impact determinations for the various species and stocks. For the NWTT proposed rule, NMFS based its negligible impact determinations[79] on abundance estimates provided either in the draft 2019 (or most recent SAR) or other more recent or applicable data for the affected species or stocks. To inform its negligible impact determinations, NMFS estimated the 'instances of total takes as a percentage of the abundance' in Tables 52–57 in the preamble to the proposed rule. However, the metric NMFS estimated is not 'instances' of any sort of taking, rather it estimated the 'percentage of the total takes relative to the abundance'. For example, there were 839 total takes of sperm whales in the NWTT study area and the abundance in the NWTT study area was 1,997 sperm whales (Table 53, 85 Fed. Reg. 34027). This results in the Navy taking approximately 42 percent of sperm whales estimated to be present in the NWTT study area. The calculation does not equate to 42 instances of total take, as implied in the table(s). In addition, contrary to NMFS's assertion in the preamble, those percentages do 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.

As another example, NMFS estimated 3,084 instances of total take for harbor seals in Hood Canal based on 61,471 takes and an abundance of 1,933 seals (Table 57, 85 Fed. Reg. 34036). However, 3,180 instances of total take would result from the estimates provided in Table 57, not 3,084 instances of total take. That difference could be perceived as minimal but one must consider that the instances of total take are a *percentage*. As such, the difference is much greater. Furthermore, the abundance estimates for harbor seals in the inland waters as described in Table 57 of the *Federal Register* notice do not comport with the abundances used by the Navy to estimate the various density

[79] And small numbers determinations, which is not applicable to military readiness activities.

estimates (see Department of the Navy 2019 based on Smultea et al. 2017). NMFS specifically stated in Table 57 that the abundance estimates for harbor seals in Hood Canal, Washington Northern inland waters, and Southern Puget Sound were based on recent Navy abundance estimates because abundances are lacking in the SARs (see footnote 1 in Table 57). Department of the Navy (2019) indicated that the abundance estimates for Hood Canal were 2,009 rather than 1,933, 3,116 rather than 8,198 for Washington Northern inland waters, and 4,042 rather than 4,068 for Southern Puget Sound. The Commission recommends that NMFS ensure that its density estimates and abundance estimates used in the negligible impact determination analyses for harbor seals in Hood Canal, Washington Northern inland waters, and Southern Puget Sound are consistent and if more recent abundance estimates from Navy monitoring efforts were used to inform the negligible impact determination analyses, use those same abundances estimates to inform its density estimates and re-estimate the numbers of takes accordingly. If NMFS intends to use the 'instances of total takes as a percentage of the abundance' in Tables 52–57 in the preamble to the final rule, the Commission recommends that it ensure that the abundance estimates, total takes, and instances of total takes as a percentage of the abundance are accurately stipulated for all three metrics in the relevant tables.

Although quantitative analyses are preferred over qualitative analyses, quantitative analyses must be accurate, well informed, and transparent. If NMFS is basing its negligible impact determinations on analyses that consider the number of times an individual could be taken in a given year or the number of days an animal could be taken, its current analytical approach does not consider or incorporate that information per se. As such, NMFS's current analyses do not support or substantiate its ultimate findings that the Navy's activities would have a negligible impact on the affected species and stocks.

Please contact me if you have questions concerning the Commission's recommendations or rationale.

Sincerely,

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

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