



MARINE MAMMAL COMMISSION

16 April 2018

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) 13 March 2018 notice (83 Fed. Reg. 10954) and the letter of authorization (LOA) application submitted by the U.S. Navy (the Navy) seeking issuance of regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act (the MMPA). The taking would be incidental to conducting training and research, development, test, and evaluation (testing) activities within the Atlantic Fleet Training and Testing (AFTT) study area (Phase III activities). The Commission reviewed and provided recommendations in its [2 August 2017 letter](#) on the Navy's Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) for conducting training and testing activities in the AFTT study area, which underpins the Navy's LOA application. NMFS authorized the Navy to conduct similar activities first under the Tactical Training Theater Assessment and Planning (TAP I) LOA applications and second under Phase II LOA applications.

Background

The Navy's AFTT study area is in the western Atlantic Ocean and encompasses the waters along the east coast of North America, the Gulf of Mexico, portions of the Caribbean Sea, Navy pier-side locations and port transit channels, waters near civilian ports, and various bays, harbors, and inland waters (i.e., lower Chesapeake Bay). The activities would involve the use of low-, mid-, high- and very high-frequency active (LFA, MFA, and HFA, respectively) sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations (including ship shock trials), expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft. The Navy would implement mitigation measures that consist of both procedural mitigation measures¹ and mitigation areas².

¹ Which primarily include visual monitoring to implement delay and shut-down procedures. Passive acoustic monitoring would be required only for sinking exercises and deployment of explosive sonobuoys and explosive torpedoes.

² Which include limiting or restricting the types and quantities of activities to be conducted, implementing speed restrictions and obtaining recent sightings information, and/or minimizing certain types of transits in specific areas.

Density estimates

The Commission recommended in previous letters regarding Navy Phase II activities that the Navy incorporate more refined data in its extrapolated density estimates, including pinniped densities in general. For AFTT Phase III activities the Navy used density data from both Roberts et al. (2016) and Mannocci et al. (2017)³—the latter provided densities for a large region of the western North Atlantic sparsely surveyed for cetaceans beyond the U.S. exclusive economic zone (EEZ) and for species in which survey data are scant or lacking. Specifically, Mannocci et al. (2017) utilized generalized additive models with various environmental covariates⁴ and reduced the extent of extrapolation beyond the covariate ranges based on methods by Miller et al. (2013)⁵. The Commission is pleased that the Navy has incorporated more refined density estimation methods in its Phase III documents. Such methods should be used for the other Navy study areas as well, particularly for areas in which densities must be extrapolated and for pinnipeds in general.

The Commission also recommended that the Navy account for uncertainty in its extrapolated⁶ density estimates for Phase II activities. For AFTT Phase III activities, the Navy incorporated uncertainty for both the density and group size estimates⁷ that seeded its animat⁸ modeling. The Commission appreciates that the Navy incorporated uncertainty in both the density and group size estimates and expects that comparable methods will be used for the other Navy study areas. The Commission notes that 30 iterations or Monte Carlo simulations is low for general bootstrapping methods used in those models but understands that increasing the number of iterations in turn increases the computational time needed to run the models. Accordingly, the Commission suggests that the Navy consider increasing the iterations from 30 to at least 200 for activities that have yet to be modeled for Phase III and for all activities in Phase IV.

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 2017a). Multiple recent studies provide additional behavioral audiograms (e.g., Branstetter et al. 2017, Kastelein et al. 2017b) and information on TTS (e.g., Kastelein et al. 2017a, 2017c). The Commission appreciates that developing weighting functions and associated thresholds is an extensive process and that the Navy cannot amend them with each new published dataset. However,

³ Relative environmental suitability models also were used for certain pinniped species.

⁴ Namely, biomass and production of epipelagic micronekton and zooplankton.

⁵ Which use spatial modeling techniques to quantify uncertainty and to incorporate data smoothing in areas with complex boundaries.

⁶ Specifically, those estimates that originated from other areas or regions that were applied directly to the various action areas.

⁷ Using means and standard deviations that varied based on a compound Poisson-gamma distribution for densities and an inverse Gaussian distribution for group sizes.

⁸ Virtual animals equipped with dosimeters.

the Navy should provide a discussion of whether those new data corroborate the current weighting functions and associated thresholds.

Behavior thresholds for non-impulsive sources—To further define its behavior thresholds for non-impulsive sources⁹, the Navy developed multiple¹⁰ Bayesian biphasic dose response functions¹¹ (Bayesian BRFs) for Phase III activities. The Bayesian BRFs were a generalization of the monophasic functions previously developed¹² and applied to behavioral response data¹³ (see Department of the Navy 2017a 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 level¹⁴. The Bayesian BRFs are reasonable and a much-needed improvement on the two dose response functions (BRFs)¹⁵ that the Navy had used both for TAP I and Phase II activities.

However, the Commission is concerned 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 16 in the *Federal Register* notice and Table C.4 in Department of the Navy 2017a). The Navy indicated it was likely that the context of the exposure is more important than the amplitude at large distances¹⁶ (Department of the Navy 2017a)—that is, the context-based response dominates the level-based response. The Commission agrees but contends that, although the distance between the animal and the sound source is an important contextual factor, such factors have already been included in the Bayesian BRFs. Including additional cut-off distances contradicts the underlying data of those functions and negates the intent of the functions themselves.

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 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

⁹ Acoustic sources (i.e., sonars and other transducers).

¹⁰ For odontocetes, mysticetes, beaked whales, and pinnipeds. The Navy used the 120-dB re 1 μ Pa unweighted, step-function threshold for harbor porpoises as it had done for Phase II activities.

¹¹ 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.

¹² By Antunes et al. (2014) and Miller et al. (2014).

¹³ From both wild and captive animals.

¹⁴ e.g., the animal's previous experience, separation distance between sound source and animal, and behavioral state including feeding, traveling, etc.

¹⁵ One for odontocetes and pinnipeds and one for mysticetes.

¹⁶ For example, the Navy indicated that the range to the basement level of 120 dB re 1 μ Pa 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).

reactions to sound pressure levels up to 140 dB re 1 μ Pa based on Southall et al. (2007; 83 Fed. Reg. 65230). The Commission notes, as did the Navy, that those data were limited and were based on sources that did not have characteristics similar to MFA sonar¹⁷. Southall et al. (2007) additionally indicated that data did not exist regarding exposures at higher received levels at that time. Luckily, 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 2017a 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 scale¹⁸ to received levels less than and equal to 140 dB re 1 μ Pa, and those data were used to inform the context portion of the Bayesian BRF.

More concerning is the fact that, 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 29 percent, for pinnipeds where the probability of response is 27 percent, and for harbor porpoises where the probability of response is 100 percent (Table 18 in the *Federal Register* notice and Table 6.4-0 in the LOA application). For harbor porpoises, the cut-off distances for MF1 sources would equate to a received level of up to 136 dB re 1 μ Pa, which is considerably greater than the 120-dB re 1 μ Pa threshold. On a related note, takes for mysticetes would be eliminated for MF1 sources at a received level of 148 dB re 1 μ Pa equating to a probability of response of 16 percent. While that percentage may seem inconsequential, the received level is actually greater than the level at which actual context-based behavioral responses were observed for feeding blue whales (see Figure 3 in Goldbogen et al. 2013¹⁹). For all of these reasons, the Commission 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 less 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 testing²⁰ (Schlundt et al. 2000). The justification for that threshold itself is a bit questionable, but more concerning is that the Navy continues to believe that marine mammals do not exhibit behavioral responses to single detonations (Department of the Navy 2017a)²¹. 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

¹⁷ 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 AirmarTM 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).

¹⁸ Equating to significant behavioral responses as specified by the Navy.

¹⁹ Data that also were used to derive the Bayesian BRFs.

²⁰ Based on 1-sec tones.

²¹ Including certain gunnery exercises that involve several detonations of small munitions within a few seconds.

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 or ship shock trials²²) would be expected to elicit ‘significant behavioral responses’²³. 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 and up to 58,000 lbs. Therefore, the Commission 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 exponents²⁴ 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 data²⁵ remain the same. The modifications yield smaller zones²⁶ in some instances and larger zones in other instances²⁷. 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 recommends that NMFS require the Navy to (1) explain why the constants and exponents for onset mortality and onset slight lung injury thresholds²⁸ 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 only used the onset mortality and onset slight lung injury criteria to determine the range to effects²⁹, while it used the 50 percent mortality and 50 percent slight lung injury criteria to estimate the numbers of marine mammal takes³⁰. 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 measures³¹ 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

²² With net explosive weights of 500 to 650 lbs (Bin E11) and 7,250 to 58,000 lbs (Bins E16 and 17), respectively.

²³ 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 (2017a) and used by the Navy to differentiate behavioral response severity.

²⁴ The constants have increased and the exponents have decreased from 1/2 to 1/6.

²⁵ Based on Richmond et al. (1973), Yelverton et al. (1973), Yelverton and Richmond (1981), and Goertner (1982).

²⁶ When animals occur at depths between the surface and 8 m, yielding higher absolute thresholds.

²⁷ When animals occur at depths deeper than 8 m, yielding lower absolute thresholds.

²⁸ Equations 11 and 12 in Department of the Navy (2017a).

²⁹ To inform the mitigation zones.

³⁰ A similar approach was taken for gastrointestinal (GI) tract injuries.

³¹ Which is discussed further herein.

take estimation process—that extensive lung hemorrhage³² is a level of injury that would result in mortality for a wild animal (Department of the Navy 2017a). Thus, it is unclear why the Navy did not follow through with that premise. The Commission recommends that NMFS 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.

Procedural mitigation measures

Mitigation effectiveness—The Navy’s proposed mitigation zones are similar to the zones³³ previously used during Phase II activities and are intended, based on the Phase III DEIS, 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 groups³⁴ from PTS. For example, the mitigation zone for an explosive sonobuoy is 549 m but the mean PTS zones range from 2,205–3,324 m for HF cetaceans and 308–1,091 m for LF cetaceans³⁵. Similarly, the mitigation zone for an explosive torpedo is 1,920 m but the mean PTS zones range from 13,105–14,627 m for HF cetaceans, 3,133–3,705 m for LF cetaceans, and 3,072–3,232 for PW³⁶. Mitigation effectiveness is further complicated when platforms fire munitions (e.g., for missiles and rockets) at targets 28 to 140 km away from the firing platform, as described in the DEIS. 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 DEIS 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). 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 DEIS for Phase III. For its Phase II DEISs, the Navy noted that data collected in that study were insufficient to yield statistically significant results. Nevertheless, the Commission continues to consider the basic information provided by the studies to be 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 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

³² i.e., onset mortality; see Table 4-1 in Department of the Navy (2017a).

³³ The Commission appreciates that the Navy has provided 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.

³⁴ Primarily high- and low-frequency (HF and LF, respectively) cetaceans and phocids (PW).

³⁵ The maximum range extends to 6,275 m for HF cetaceans (Table 9-16) and 1,525 m for LF cetaceans (Table 9-17) based on varying propagation environments as presented in Navy (2017b).

³⁶ The maximum ranges extend to 41,775 m for HF (Table 9-16), 8,775 m for LF (Table 9-17), and 8,275 m for PW (Table 9-22) based on varying propagation environments as presented in Department of the Navy (2017b).

(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 2010). Neither the details regarding those reports nor the raw sightings data were provided to confirm this. The Commission is not aware of any additional data that have been made available since 2014 but understands that any data that have been collected since then would not be sufficient to conduct a statistical analysis.

The Commission anticipates that the lookout effectiveness study will be very informative once completed, but notes that in the interim, the preliminary data *do* provide an adequate basis for taking a precautionary approach. 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 including passive acoustic monitoring. The Navy did propose to supplement visual monitoring with passive acoustic monitoring during three explosive activity types but not during the remaining explosive activities or during LFA, MFA, and HFA 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. But, it indicated in its Phase III DEIS that it is not able to use HF/M3 during training and testing activities due to limitations regarding space, personnel, and the resources needed to design, build, install, and maintain the devices. The Navy however did not specify the limitations that prevent it from being able to use passive acoustic capabilities (devices and other assets) to monitor more than the three explosive activity types. As an example of how the presumed difficulties might be overcome, the Commission suggests that sonobuoys could be deployed with the target in the various target areas prior to the activity. This approach would allow the Navy to better determine whether the target area is clear and remains clear until the munition is launched.

The Navy indicated in the DEIS that it was continuing to improve its capabilities for using range instrumentation to aid in the passive acoustic detection of marine mammals. For example, at the Southern California Offshore Range, the Pacific Missile Range Facility off Kauai, and the Atlantic Undersea Test and Evaluation Center in the Bahamas, the Navy has capabilities to monitor instrumented ranges in real time or through data recorded by hydrophones. The Commission has supported the use of the instrumented ranges to fulfill mitigation implementation (see the Commission's [16 May 2017 letter](#)). Similar capabilities should be available at the Navy's instrumented Undersea Warfare Training Range (USWTR) off Jacksonville, which is expected to be in use in the next several years.

Given that the effectiveness of Navy lookouts conducting visual monitoring has yet to be determined, 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 NMFS require the Navy to use passive and active acoustic monitoring, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for *all* activities that have the potential to cause injury or mortality, including the use of the instrumented USWTR in the coming years.

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 likely could not provide additional assets to clear an area prior to an activity, the existing assets (primarily for aircraft³⁷) could conduct additional flyovers of the mitigation zone before expending any ordnance. Therefore, the Commission recommends that NMFS require the Navy to conduct additional pre-activity overflights before conducting any activities involving detonations barring any safety issues (e.g., low fuel).

In addition, NMFS would require the Navy to 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 or vessels or when personnel retrieve the targets. The Commission recommends that NMFS require the Navy to conduct post-activity monitoring for activities involving medium- and large-caliber projectiles, missiles, rockets, and bombs.

Range to TTS—On the topic of TTS, the ranges to effect provided in Table 24 of the *Federal Register* notice and Table 6.4-3 of the LOA application appear to be incorrect. The ranges for LF cetaceans should increase with increasing sonar emission time, as demonstrated by MF cetaceans. In addition, the ranges for MF cetaceans should not be greater than LF cetaceans based on the source being low-frequency in nature and the associated thresholds and weighting functions for the two functional hearing groups. Therefore, the Commission recommends that NMFS determine what the appropriate ranges to TTS for bin LF5 should be and amend the ranges for the various functional hearing groups in the various tables accordingly.

Mitigation areas

North Atlantic right whales—NMFS identified numerous biologically important areas (BIAs) in the AFTT study area. BIAs are of known importance for reproduction, feeding, or migration or are areas where small and resident populations are known to occur—the BIAs originated from LaBrecque et al. (2015a and 2015b). NMFS used BIAs, critical habitat, important habitat, etc. to inform multiple mitigation areas associated with minimizing impacts on North Atlantic right whales. Although noted as BIAs for feeding and mating, NMFS did not include either Jeffreys Ledge³⁸ or the central Gulf of Maine³⁹ in the Navy's Northeast North Atlantic Right Whale Mitigation Area⁴⁰. Similarly, NMFS included only a small portion of the North Atlantic right whale calving BIA⁴¹ in the Southeast North Atlantic Right Whale Mitigation Area⁴².

³⁷ Particularly in cases when aircraft routinely have extra fuel available, as some aircraft dump their fuel prior to landing.

³⁸ During the months of June–July and October–December based on Figure 2.4 in LaBrecque et al. (2015a).

³⁹ During the months of November–January based on Figure 2.6 in LaBrecque et al. (2015a).

⁴⁰ The areas are noted as 1 and 2, respectively, in Figure 11.2-1a of the LOA application. Cape Cod and Massachusetts Bays, the Great South Channel, and Georges Banks were included in the Mitigation Area.

⁴¹ Area 2 in Figure 11.2-2 of the LOA application, which is based on Figure 2.5 in LaBrecque et al. (2015a).

⁴² See Figure 5.4-5 in the DEIS, as Figure 11.2-2 in the LOA application is missing this area.

The abundance of North Atlantic right whales has been declining in recent years, and NMFS declared an unusual mortality event (UME) in 2017. Eighteen whales have been confirmed dead⁴³ as part of the UME, some due to blunt trauma likely from vessel strike (83 Fed. Reg. 10993). Further, zero right whale calves have been observed on the calving grounds in winter 2017–18 (Hain 2018)⁴⁴. Given the species' declining status and risk of extinction, the Commission recommends that NMFS include (1) both Jeffreys Ledge and the central Gulf of Maine⁴⁵ in the Navy's Northeast North Atlantic Right Whale Mitigation Area at least during the timeframes noted by LaBrecque et al. (2015a) and (2) the entire extent of the calving BIA as depicted in LaBrecque et al. (2015a) in the Southeast North Atlantic Right Whale Mitigation Area. If NMFS chooses not to implement the Commission's recommendation, then the Commission recommends that, for both Jeffreys Ledge and the central Gulf of Maine⁴⁰ during the timeframes noted by LaBrecque et al. (2015a) and the North Atlantic right whale calving BIA as depicted in and during the timeframes noted by LaBrecque et al. (2015a), NMFS require the Navy to (1) implement speed restrictions of no more than 10 knots during vessel transits, (2) obtain the latest North Atlantic right whale sightings information prior to transits from either the Northeast Fisheries Science Center's North Atlantic Right Whale Sighting Advisory System or the Southeast Regional Office's North Atlantic Right Whale Early Warning System, (3) use the sightings information to reduce potential interactions with North Atlantic right whales during transits, and (4) implement speed reductions after a vessel observes a North Atlantic right whale, if a vessel is within 5 nmi of a sighting reported to the North Sighting Advisory System or Early Warning System within the past week, and when operating at night or during periods of reduced visibility.

Gulf of Mexico Bryde's whales—Similar to North Atlantic right whales, NMFS used BIAs from LaBrecque et al. (2015b) to inform portions of the Gulf of Mexico Planning Awareness Mitigation Area. The year-round Bryde's whale BIA was demarcated between the 100- to 300-m isobaths in the eastern Gulf of Mexico from the head of the De Soto Canyon off Pensacola to northwest of Tampa Bay, Florida (Figure 3.1 in LaBrecque et al. 2015b). The range of the species has more recently been updated. Rosel et al. (2016) expanded the range to the extent of the 400-m isobath and westward to Mobile Bay, Alabama, based on additional sightings data. NMFS acknowledged the expansion of the Bryde's whale BIA in the *Federal Register* notice (83 Fed. Reg. 10993) but did not specify if and how those range expansions were incorporated in the Navy's Gulf of Mexico Planning Awareness Mitigation Area (see Area 2 in Figure 11.2-3a in the LOA application). Regardless, it does not appear that the Mitigation Area extends to the 400-m isobath in the northern portions of Area 2 or to Mobile Bay. Further, it is unclear whether the northern portion of Area 2, if extended to the 400-m isobath, would overlap the Navy's Ship Shock Trial Area (also depicted in Figure 11.2-3a of the LOA application). In any event, NMFS did not propose to restrict underwater detonations in Area 2 of the Gulf of Mexico Planning Awareness Mitigation Area as it had for the Northeast North Atlantic Right Whale Mitigation area. Underwater detonations should be restricted in that area as well.

Given that there are estimated to be only 33 individual Gulf of Mexico Bryde's whales and there is a strong likelihood that the population will be listed as endangered in the coming months,

⁴³ <https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-north-atlantic-right-whale-unusual-mortality-event>

⁴⁴ <https://www.apnews.com/1d40ffc50ea44cc5a78d6525b9bbe837>

⁴⁵ Areas 1 and 2 in Figure 11.2-1a of the LOA application.

the Commission recommends that NMFS (1) expand Area 2 in the Gulf of Mexico Planning Awareness Mitigation Area to include the waters (a) out to the 400-m isobath along Area 2's entire extent and (b) from the 100- to 400-m isobaths from Pensacola, Florida, to Mobile Bay, Alabama, (2) move, as necessary, the Ship Shock Trial Area farther offshore to allow a minimum of a 5-nmi buffer⁴⁶ between the expanded Area 2 and the Ship Shock Trial Area, and (3) restrict the Navy from conducting underwater detonations in Area 2. Because Bryde's whales have been struck and killed by vessels (Waring et al. 2016), the Commission further recommends that NMFS require the Navy to implement year-round speed restrictions of no more than 10 knots during vessel transits in Area 2 of the Gulf of Mexico Planning Awareness Mitigation Area.

Ship shock trial areas—All proposed ship shock trial areas are outside the Mitigation Areas and Planning Awareness Areas, except for the two Mid-Atlantic Planning Awareness Areas (see Figure 11.2-2 in the LOA application). In those two instances, only a small portion of the ship shock trial areas fall within the Planning Awareness Areas. Neither NMFS nor the Navy has provided sufficient justification regarding why the ship shock trial areas must be within the Mid-Atlantic Planning Awareness Areas, particularly based on the extents of the proposed ship shock trial areas⁴⁷. Therefore, the Commission recommends that NMFS require the Navy to move the ship shock trial areas beyond the extents of the two Mid-Atlantic Planning Awareness Areas and allow a minimum of a 5-nmi buffer⁴³ between the Planning Awareness Areas and the ship shock trial areas.

Least practicable adverse impact standard

In its [30 May 2017 letter](#) regarding the SURTASS LFA sonar proposed rule, the Commission provided several recommendations concerning the least practicable adverse impact standard. The Commission recommended that NMFS adopt a two-step approach when applying the least practicable adverse impact standard. First, it should identify the criteria it will use to determine whether adverse impacts on marine mammal species or stocks or their habitat are anticipated. If adverse impacts are identified, the second step should be to determine whether measures designed to reduce those impacts are available and practicable. In the AFTT proposed rule, NMFS applied a two-step analysis, but one that differs from the approach recommended by the Commission. Rather than assessing whether the proposed activities have the potential to have adverse impacts on marine mammal species or stocks, the first factor in NMFS's analysis was "the manner in which, and the degree to which, implementation of potential [mitigation] measure(s) is expected to reduce adverse impacts to marine mammal species or stocks, their habitat, and their availability for subsistence uses (where relevant)." In applying its analysis, NMFS considered "such things as the nature of the potential adverse impact (such as likelihood, scope, and range), the likelihood that the measure will be effective if implemented, and the likelihood of successful implementation."

The Commission agrees with some, but not all of NMFS's proposed steps for applying the least practicable adverse impact standard. The Commission agrees with NMFS (and the courts that have ruled on the matter) that the least practicable adverse impact standard is separate from, and in addition to, the negligible impact standard. A key threshold that must be met before an incidental take authorization can be issued is whether the anticipated taking will have no more than a negligible impact on the affected marine mammal species and stocks. However, even if the impacts are

⁴⁶ Based on the 3.5-nmi mitigation zone stipulated in Table 57 of the *Federal Register* notice.

⁴⁷ Both in water depth and latitudinally/longitudinally, which could factor into proximity to Navy installations and assets.

considered negligible, NMFS has an obligation to prevent or reduce further any remaining adverse impacts if it is practicable to do so.

The Commission also agrees that, as is the case with the negligible impact standard, the least practicable adverse impact standard is to be implemented at the level of marine mammal species and stocks. And, as NMFS recognized in its discussion in the preamble to the proposed rule, population-level effects accrue through effects on individuals, such that evaluation of potential impacts and mitigation measures needs to focus on individual animals, as well as at the species or stock level. The Commission further posits that deaths of or serious injuries⁴⁸ to marine mammals that occur pursuant to activities conducted under an incidental taking authorization, while perhaps negligible to the overall health and productivity of the species or stock and of little consequence at that level, nevertheless are clearly adverse to the individuals involved and results in some quantifiable (though negligible) adverse impact on the population; it reduces the population to some degree. 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), including taking measures in an authorization to eliminate or reduce the likelihood of lethal taking. The Commission recommends that NMFS address this point explicitly in its 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.⁴⁹

The Commission further recommends that NMFS address the habitat component of the least practicable adverse impact provision in greater detail. The language in the MMPA strongly suggests that Congress believed that activities that compromise the value of important habitat (e.g., rookeries, mating grounds, and areas of similar significance) would always constitute an adverse impact and should be avoided or minimized whenever practicable. In light of this focus on habitat in the statutory provision, it is curious that NMFS's discussion of critical habitat, marine sanctuaries, and BIAs in the proposed rule is not integrated with the discussion of the least practicable adverse impact standard. It would seem that, under the least practicable adverse impact provision, adverse impacts on important habitat should be avoided whenever practicable. Therefore, to the extent that activities would be allowed to proceed in these areas, NMFS should explain why it is not practicable to constrain them further.

Because NMFS's proposed criteria for applying the least practicable adverse impact standard coningle elements related to whether impacts are adverse and whether potential mitigation measures are likely to be effective, NMFS's analysis is not as clear as it should be. For example, it is not readily apparent how the status of a species or stock is relevant to determining whether a proposed mitigation measure will be effective in reducing impacts or in evaluating the appropriateness of certain mitigation measures. While the Commission believes that killing a marine mammal should always be considered adverse, it agrees that the status of a stock is relevant in determining whether

⁴⁸ NMFS has defined serious injury as "any injury that will likely result in mortality" (50 C.F.R. § 229.2) so, for purposes of this analysis, the Commission is treating serious injuries as lethal taking.

⁴⁹ In making this recommendation, the Commission recognizes that there may be situations when directed killing of a marine mammal benefits the population (e.g., the removal of a rogue male monk seal that is killing pups or females or sacrificing an animal to help find a cure for a disease that is decimating a population), but the Commission does not think that the incidental, unintentional taking allowed under section 101(a)(5)(A) constitutes such a situation.

sub-lethal impacts (e.g., those from disturbance) are considered adverse to the affected marine mammal species or stock. That is, an impact that is unlikely to lead directly to the death of a marine mammal might be considered adverse to a depleted and declining stock but not to a healthy, thriving one. However, once a determination has been made that an impact would be adverse, the only question remaining is whether it is practicable to eliminate or reduce that impact. The Commission 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. In this regard, it seems as though the proposed “effectiveness” criterion more appropriately fits as an element of practicability and should be addressed under that prong of the analysis the Commission has recommended. In other words, a measure not expected to be effective should not be considered a practicable means of reducing impacts.

The most concerning element of NMFS’s implementation of the least practicable adverse impact standard is its suggestion that the mitigation measures proposed by the Navy will “sufficiently reduce impacts on the affected mammal species and stocks and their habitats” (83 Fed. Reg. 11045). That phrase suggests that NMFS is applying a “good-enough” standard to the Navy’s activities. Under the statutory criteria, however, those proposed measures are “sufficient” only if they have either (1) eliminated all adverse impacts on marine mammal species and stocks and their habitat or (2) if adverse impacts remain, it is impracticable to reduce them further. The Commission recommends that NMFS recast its conclusions to address these specific points and to provide sufficient detail as to why additional measures either are not needed (i.e., there are no remaining adverse impacts) or would not be practicable to implement.

Additionally, in its comments on the Navy’s SURTASS LFA sonar proposed rule, the Commission sought clarification as to whether NMFS intended the discussion of least practicable adverse impact in that rule to provide the “formal interpretation” of that standard called for by the Ninth Circuit Court of Appeals in *NRDC v. Pritzker*. The Commission noted that such general guidance normally would be provided in an agency policy statement or in broader regulations implementing section 101(a)(5) of the MMPA, rather than in regulations specific to a particular authorization. The Commission again is concerned that NMFS is seeking to adopt generally applicable policy statements in this specific proposed rule rather than through a generally applicable regulation or policy directive, particularly if this is going to be an iterative process spanning multiple proposed rules, as now appears to be the case. The Commission therefore recommends that any “formal interpretation” of the least practicable adverse impact standard by NMFS be issued in a stand-alone, generally applicable rulemaking (e.g., in amendments to 50 C.F.R. § 216.103 or § 216.105) or in a separate policy directive, rather than in the preambles to individual proposed rules.

Level A harassment and mortality takes

The Navy used various post-model analyses for estimating 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 most recent [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 avoid any additional exposures at levels that could cause PTS (Department of the Navy 2017a). 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 2017a). That assumption has no scientific basis. Given that sound sources are moving, it may not be until later during an activity that the animal is close enough to experience PTS and it is those few close pings that contribute to the potential to experience PTS. The fact of an animal being beyond the PTS zone initially has no bearing on whether it will come within close range later during an activity since both sources and animals are moving. In addition, Navy vessels may move faster than the ability of the animals to evacuate the area. The Navy should have been able to query the dosimeters of the animals to verify whether its 5-percent assumption was valid.

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 and zeroed out those takes to be enumerated 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 flaws of the cut-off distances, which reduced the numbers of takes, were articulated in a previous section of this letter and it seems apparent that the post-analyses as a whole would underestimate the various numbers of takes. Therefore, the Commission again recommends that NMFS (1) authorize 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) use those numbers, in addition to the revised Level B harassment takes⁵⁰, to inform its negligible impact determination analyses.

Pile-driving activities

The Navy did not indicate whether it estimated the ranges to effects during pile-driving activities, and ultimately the numbers of marine mammal takes, using the Navy Acoustic Effects Model (NAEMO) or NMFS's user spreadsheet. However, based on the estimated extents of the

⁵⁰ Based on the Bayesian BRFs only, not including the cut-off distances.

PTS zones⁵¹, the Navy does not appear to have used NMFS's user spreadsheet. That tool would yield PTS zones⁵² for impact pile driving that range from 55 to 1,343 m for the various functional hearing groups. If the Navy incorporated the relevant source spectra and actual weighting functions, those zones would be smaller but not as small as reported by the Navy. The Navy apparently did not accumulate the energy over the entire day of activities, which is standard practice for all pile-driving activities including those the Navy conducts (e.g., 83 Fed. Reg. 9366 and 10689). Rather, the Navy appears to have used approximately 1 minute⁵³ of impact pile driving⁵⁴ to inform the various zones rather than the full 90 minutes of activities proposed. The ranges to PTS and TTS for vibratory pile driving similarly are non-reproducible from the information provided in the *Federal Register* notice and LOA application.

In addition, the PTS and TTS zones for LF and HF cetaceans are estimated to be the same during impact pile-driving activities (Table 3.7-19 in the DEIS). Neither NAEMO (based on results for the other broadband sources) nor NMFS's user spreadsheet would yield the exact same ranges for LF and HF cetaceans. Therefore, the Commission recommends that NMFS require the Navy to (1) specify what modeling method and underlying assumptions, including any relevant source spectra and assumed animal swim speeds, were used to estimate the ranges to PTS and TTS for impact *and* vibratory pile-driving activities, (2) accumulate the energy for the entire day of proposed activities to determine the ranges to PTS and TTS for impact *and* vibratory pile-driving activities, and (3) clarify why the PTS and TTS ranges were estimated to be the same for LF and HF cetaceans during impact pile driving.

Negligible impact determination

NMFS applied both qualitative and quantitative analyses to inform its negligible impact determination. In general, NMFS has based negligible impact determinations⁵⁵ associated with incidental take authorizations on abundance estimates provided either in its stock assessment reports (SARs) or other more recent published literature. For the AFTT proposed rule, NMFS used the average population estimate as determined by the Navy's density models across all seasons from Roberts et al. (2016)⁵⁶ rather than abundance estimates from either the SARs or published literature. For some species, NMFS indicated that it had apportioned the takes at the species or population level based on takes predicted at higher taxonomic levels. However, NMFS did not specify for which species/populations this method was used or the assumptions made. NMFS also did not specify how it determined the actual 'population' size given that the densities differ on orders of

⁵¹ Ranging from 2 to 65 m for the various functional hearing groups in Table 37 of the *Federal Register* notice and Table 6.4-37 of the LOA application.

⁵² Assuming six piles would be driven per day with 35 strikes per minute for a total of 15 minutes per pile, a source level of 182 dB re 1 $\mu\text{Pa}^2\text{-sec}$, transmission loss of 16.5 (Sections 1.4.1.3 and 6.4.4.1.3 of the LOA application), and a weighting factor adjustment of 2 kHz. The Commission further notes that Table 2 in the *Federal Register* notice and Table 1.4-2 in the LOA application indicate that the source level metric for impact pile driving is a peak sound pressure level. The 192-dB re 1 μPa source level is based on root-mean-square (rms), not peak. The peak value would be approximately 15 dB greater than the rms value. The tables should be amended accordingly.

⁵³ If this is in fact the case, the Navy would have assumed that animals would only be exposed during the first minute (or two) of pile-driving activities consistent with its assumptions for its acoustic sources discussed previously herein. Although consistent with those assumptions, it is not consistent with real-world conditions.

⁵⁴ Which would yield zones ranging from 3 to 68 m based on the assumptions in the previous footnote and 30 strikes.

⁵⁵ And small numbers determination, which is not applicable to military readiness activities.

⁵⁶ A similar approach was used for geophysical and geotechnical activities in the Atlantic.

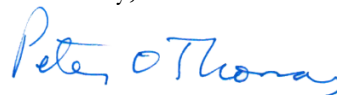
kilometers⁵⁷. Interpolation or smoothing, and potentially extrapolation, of data likely would be necessary to achieve NMFS's intended goal—it is unclear whether any such methods were implemented. In addition, it is unclear whether NMFS used data from Mannocei et al. (2017) in a similar manner to the Roberts et al. (2016) data, which informed abundance estimates for the majority of species within the EEZ. Furthermore, NMFS did not specify how it determined the proportion of total takes that would occur beyond the EEZ. Presumably, that was based on modeling assumptions and model-estimated takes provided by the Navy, but this is not certain.

Moreover, the 'instances' of the specific types of taking (i.e., mortality, Level A and B harassment) do not match the total takes 'inside and outside the EEZ' in Tables 72–77 or those take estimates in Tables 39–41. It appears the 'instances' of take columns were based on only those takes in the EEZ rather than the entire AFTT study area. Sperm whales, for example, have 3,880 takes that presumably would occur outside the EEZ and were not enumerated in the 'instances' of take columns. Thus, it is unclear what types of takes those constitute. Given that the negligible impact determination is based on the total taking in the entire study area, NMFS should have partitioned the takes in the 'instances' of take columns in Tables 72–77 for all activities that occur within *and* beyond the EEZ.

In short, NMFS's analytical approach is not transparent. The methods and resulting data cannot be substantiated with the information provided. Quantitative analyses are preferred over qualitative analyses but only if those quantitative analyses are appropriate and well informed. Until such time that NMFS provides the relevant information, the Commission and the public cannot comment on NMFS's quantitative analysis for its negligible impact determination. However, based on previous AFTT rules, NMFS very likely will come to the same conclusion that the Navy's activities would have no more than a negligible impact, particularly given that the proposed activities have decreased from those authorized in Phase II.

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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⁵⁷ Resolution is at a scale of 10 km.

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