31 March 2014

Ms. Jolie Harrison, Supervisor
Incidental Take Program
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) 19 March 2014 notice (79 Fed. Reg. 15388) and the letter of authorization (LOA) application submitted by the U.S. Department of the Navy seeking issuance of regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act (the MMPA). The regulations would authorize the taking of marine mammals incidental to training and research, development, test, and evaluation activities conducted from 2015 to 2020 within the Mariana Islands Training and Testing study area (MITT). The Commission previously commented on NMFS's Advance Notice of Proposed Rulemaking on 23 October 2013 and the Navy's Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) on 24 October 2013 regarding the proposed activities. The Commission has commented on other draft environmental impact statements and previously proposed regulations for similar activities at other Navy training and testing study areas, including the Hawaii-Southern California Fleet Training and Testing study area (HSTT; 10 July 2012, 5 November 2012, 7 March 2013, and 20 February 2014 Commission letters).

RECOMMENDATIONS

The Marine Mammal Commission recommends that, prior to publishing the final regulations, NMFS—

- require the Navy to (1) account for uncertainty in extrapolated density estimates for all species by using the upper limit of the 95% confidence interval or the arithmetic mean plus two standard deviations and (2) then re-estimate the numbers of takes accordingly;
- require the Navy to (1) use 157 rather than 152 dB re 1 μPa^2-sec as the temporary threshold shift (TTS) threshold for high-frequency cetaceans exposed to acoustic sources, (2) use 169 rather than 172 dB re 1 μPa^2-sec as the TTS thresholds for mid- and low-frequency cetaceans exposed to explosive sources, (3) use 145 rather than 146 dB re 1 μPa^2-sec as the TTS threshold for high-frequency cetaceans for explosive sources, and (4)(a) based on these changes to the TTS thresholds, adjust the permanent threshold shift (PTS) thresholds for high-frequency cetaceans exposed to acoustic sources by increasing the amended TTS threshold by 20 dB and for low-, mid-, and high-frequency cetaceans exposed to explosive

sources by increasing the amended TTS thresholds by 15 dB and (b) adjust the behavioral thresholds for low-, mid-, and high-frequency cetaceans exposed to explosive sources by decreasing the amended TTS thresholds by 5 dB;

- require the Navy to use spatially and temporally dynamic simulation models rather than simple probability calculations to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedoes, unmanned underwater vehicles and use of expended munitions, ordnance, and other devices);
- require the Navy to provide the predicted average and maximum ranges for all impact criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), for all activities (i.e., based on the activity category and representative source bins and include ranges for more than 1 ping), and for all functional hearing groups of marine mammals within MITT representative environments (including shallow-water nearshore areas);
- require the Navy to use passive and active acoustics, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that could cause PTS, injury, or mortality beyond those explosive activities for which passive acoustic monitoring already was proposed;
- require the Navy to use a second clearance time category of 60 minutes for deep-diving species (i.e., beaked whales and sperm whales) if the animal has not been observed exiting the mitigation zone;
- require the Navy to (1) provide the range to effects for all impact criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality) for underwater detonations that involve time-delay firing devices based on sound propagation in shallow-water nearshore environments for the associated marine mammal functional hearing groups and (2) use those data coupled with the maximum charge weight and average swim speed of the fastest group of marine mammals as the basis for the mitigation zone for underwater detonations that involve time-delay firing devices—if NMFS does not require the Navy to adjust its mitigation zones, then it should authorize the numbers of takes for Level A harassment and mortality based on the possibility that marine mammals could be present in the mitigation zone when the explosives detonate and based on updated, more realistic swim speeds;
- require the Navy to submit a proposed monitoring plan for the MITT Study Area for public review and comment;
- authorize the total numbers of model-estimated Level A harassment and mortality takes rather than allowing the Navy to reduce the estimated numbers of Level A harassment and mortality takes based on the Navy's proposed post-model analysis;
- require the Navy to (1) describe what it used as the upper limit of behavioral response function$_1$ (BRF_1) for low-frequency cetaceans and the upper limits of BRF_2 for both mid- and high-frequency cetaceans, including if it assumed a 1-sec ping for all sources and (2) if the upper limits of the BRFs were based on weighted thresholds, use the unweighted or M-weighted thresholds of 195 dB re 1 μPa^2-sec for low- and mid-frequency cetaceans and 176 dB re 1 μPa^2-sec for high-frequency cetaceans to revise its behavior take estimates for all marine mammals exposed to acoustic sources; and
- require the Navy to round its takes, based on those takes in the MITT-TR tables, to the nearest whole number or zero in all of its take tables and then authorize those numbers of takes.

BACKGROUND

The Navy proposes to conduct training and testing activities (1) at both at-sea ranges near and land-based training areas on Guam and the Commonwealth of the Northern Mariana Islands (the CNMI), (2) in operating areas and special-use airspace in the region of the Mariana Islands that are part of the Mariana Islands Range Complex (MIRC) and the Complex's surrounding seas, and (3) in the transit corridor between the MIRC and the Hawaii Range Complex. The activities would involve the use of low-, mid-, high- and very high-frequency sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations, expended materials, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles (including gliders), and aircraft.

RATIONALE

Uncertainty in density estimates

The Navy estimated marine mammal densities in MITT based on (1) models that use direct survey sighting data and distance sampling theory, (2) models that use known or inferred habitat associations to predict densities (e.g., relative environmental suitability (RES) models), typically in areas where survey data are limited or non-existent, or (3) extrapolation from neighboring regional density estimates or population/stock assessments based on expert opinion (Department of the Navy 2013b). The Navy did note that estimates from both RES models and extrapolated densities include a high degree of uncertainty (Department of the Navy 2013b)—although it doesn't appear that the Navy included a measure of uncertainty (e.g., standard deviation, coefficient of variation, confidence interval, etc.) in those estimates.

For example, the Navy indicated that, in the absence of any other density data in this region, the minke (for the transit corridor) and humpback whale (for MITT and the transit corridor) density estimates were based on an LGL Limited (2008) survey in southeast Asia. Similarly, the data regarding *Kogia* spp. for MITT originated from line-transect surveys in Hawaii (Barlow 2006) and for the transit corridor from LGL Limited (2008). The Navy believed that those data provide a reasonable approximation given their habitat assumptions (i.e., a mix of bathymetry but primarily deep water habitat) but noted the uncertainty regarding how representative these density data are to MITT. Further, the Navy used data from Fulling et al. (2011) to estimate the densities of various mysticetes and odontocetes. Although those surveys were conducted in Guam and the CNMI, Fulling et al. (2011) acknowledged that their estimates were probably of low precision and were underestimated because sighting conditions during the surveys were poor, with 66 percent of the total effort occurring in Beaufort sea states of 4 to 7.

The Commission understands that density data are not available for all areas in which activities occur, and in areas where such data are available the densities could be underestimated. However, the Commission continues to believe that action proponents, including the Navy, should use the best available density estimate plus some measure of uncertainty (e.g., mean plus two standard deviations, mean plus the coefficient of variation, the upper confidence interval) in those instances. If one uses a "best" density estimate, there is approximately a 50 percent chance that the actual density is either greater or less than that estimate. In this case, the density estimates from

Fulling et al. (2011) have an associated coefficient of variation, and that uncertainty could be incorporated into the density estimates. Further, the Navy indicated that uncertainty characterized in the original density data references was catalogued and retained for potential later use. Thus, those values should be readily available for analysis. Therefore, the Commission recommends that NMFS require the Navy to (1) account for uncertainty in extrapolated density estimates for all species by using the upper limit of the 95% confidence interval or the arithmetic mean plus two standard deviations and (2) then re-estimate the numbers of takes accordingly.

Criteria and thresholds

The Navy proposed to estimate the numbers of takes resulting from its activities by adjusting received sound levels at different frequencies based on the hearing sensitivity of various groups of marine mammals at those frequencies. The adjustments were based on "weighting" functions derived by Southall et al. (2007) and Finneran and Jenkins (2012; Type I and Type II weighting functions, respectively). Type I weighting functions (see Figure 1 in Southall et al. 2007) are flat over a wide range of frequencies and then decline at the extremes of the animal's hearing range. Type II weighting functions (Finneran and Jenkins 2012) are used only for cetaceans and combine the precautionary Type I curves developed by Southall et al. (2007) with equal loudness weighting functions derived from empirical studies of bottlenose dolphins (Finneran and Schlundt 2011).

The Commission considers the theory behind those weighting functions to be reasonable. However, the amplitudes of the final Type II weighting functions were adjusted by lowering the sound exposure levels (SELs) at all frequencies by roughly 16–20 dB (compare Figures 2 and 6 of Finneran and Jenkins (2012)). For sonar-related activities, Finneran and Jenkins (2012) reduced the TTS thresholds for acoustic sources for low- and mid-frequency cetaceans (see Table 2 in Southall et al. 2007 for information on functional hearing groups) by 17 dB (assuming they rounded up from 16.5 dB). Because data are lacking for TTS thresholds for high-frequency cetaceans exposed to acoustic (i.e., tonal) sources, Finneran and Jenkins (2012) indicated that a 6-dB correction factor then was added to the TTS threshold (because it was derived from exposure to non-explosive impulsive sources (i.e., from airguns) rather than acoustic sources) based on the method outlined in Southall et al. (2007). However, the Commission's understanding is that Southall et al. (2007) did not use a 6-dB correction factor to extrapolate between impulsive and acoustic thresholds, but rather to estimate PTS thresholds from TTS thresholds based on peak pressure levels. Southall et al. (2007) did indicate that the TTS threshold for acoustic (nonpulse) sources was 12 dB greater than for explosive sources (pulses) based on SELs (195 vs 183 dB re 1 μPa^2-sec[1], respectively). If the explosive threshold of 164.3 dB re 1 μPa^2-sec (based on Lucke et al. (2009) and used in Finneran and Jenkins (2012)) is increased by 12 dB, the resulting unadjusted TTS threshold would be 176.3 dB re 1 μPa^2-sec for acoustic sources. That threshold then should have been adjusted by 19.4 dB to yield a TTS threshold of 157 dB re 1 μPa^2-sec.

Further, it is unclear how the explosive thresholds (i.e., for underwater detonations) were adjusted downward to account for the amplitude decrease in the Type II weighting functions. For example, Finneran and Jenkins (2012) indicated that they used Finneran et al. (2002) TTS data of 186 dB re 1 μPa^2-sec to determine the TTS threshold for explosives for mid-frequency cetaceans,

[1] Those TTS thresholds were based on Schlundt et al. (2000) and Finneran et al. (2002).

which also was supported by Southall et al. (2007). But if one uses the purported method of subtracting 16.5 dB from that threshold, the resulting Type II weighted SEL would be 169.5 (it appears it should be rounded down to 169 based on the Finneran and Jenkins (2012) document) rather than 172 dB re 1 μPa^2-sec. Finneran and Jenkins (2012) proposed to use 172 dB re 1 μPa^2-sec for low-frequency cetaceans as well. Lastly, they appear to use a correction factor of 18 rather than 19.4 to adjust the Type II weighted SEL for high-frequency cetaceans. The Commission is concerned that the TTS thresholds for explosive sources that the Navy used not only are greater than they should be based on the methods described but also are used as the basis for the PTS and behavioral thresholds. Thus, if those thresholds were not adjusted by the appropriate amplitude factors, the Navy may have estimated the numbers of takes of marine mammals incorrectly. To address these concerns, the Commission recommends that NMFS require the Navy to (1) use 157 rather than 152 dB re 1 μPa^2-sec as the TTS threshold for high-frequency cetaceans exposed to acoustic sources, (2) use 169 rather than 172 dB re 1 μPa^2-sec as the TTS thresholds for mid- and low-frequency cetaceans exposed to explosive sources, (3) use 145 rather than 146 dB re 1 μPa^2-sec as the TTS threshold for high-frequency cetaceans for explosive sources, and (4)(a) based on these changes to the TTS thresholds, adjust the PTS thresholds for high-frequency cetaceans exposed to acoustic sources by increasing the amended TTS threshold by 20 dB and for low-, mid-, and high-frequency cetaceans exposed to explosive sources by increasing the amended TTS thresholds by 15 dB and (b) adjust the behavioral thresholds for low-, mid-, and high-frequency cetaceans exposed to explosive sources by decreasing the amended TTS thresholds by 5 dB.

Probability of strike

The Navy used a qualitative assessment to determine the number of whales that could be struck by a vessel based on historical data. The Navy also estimated the probabilities of expended munitions and non-explosive materials (e.g., sonobouys) striking a marine mammal based on simple probability calculations (Appendix G of its DEIS). In doing so, the Navy compared the aggregated footprint of some specific marine mammal species with the footprint of all objects that might strike them. Both of those were based only on densities of marine mammals in the action area and expected amount of materials to be expended within a year in those areas. By combining marine mammal densities and those activities over space and time into a single calculation, the Navy provided only a crude estimate of strike probabilities for the average condition, which may have been underestimated based on the shortcomings of the density data (as previously discussed). Neither marine mammals nor Navy activities are distributed homogeneously in space or time. To provide a more reliable estimate of possible takes from munitions and materials, the Navy should incorporate spatial and temporal considerations in its calculations to estimate takes. For example, the Navy's model for determining takes of marine mammals from sound-producing activities can account for the movement of sound sources and marine mammals. Using that model to estimate the probability of a ship strike, the Navy could change the data collected by the animat dosimeters from a received sound level to a close-approach distance, which would result in more realistic strike probabilities.

For the HSTT Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS), the Navy indicated that it considered using a dynamic simulation model to estimate strike probabilities but determined that use of historical data was more appropriate for the analysis. The Navy believed that those data account for real-world variables over many years, and any model would be expected to be less accurate than the use of actual data. The Commission

disagrees with that conclusion. First of all, the activities under the Preferred Alternative would increase over baseline (i.e., the No Action Alternative). As an example, the number of training activities involving vessel movement for surface-to-surface gunnery exercises would increase by nearly 600 percent over the No Action Alternative (49 vs. 290 activities) and using the historical rate of ship strikes based on lesser numbers of vessels would underestimate the possibility of ship strikes under the Preferred Alternative. Further, the Commission supports the use of actual data relevant to the activities proposed under the alternatives. However, those data should be used to seed the dynamic simulation models rather than in the qualitative assessment of vessel strike or current crude calculations of strike probabilities for expended munitions and materials. For these reasons, the Navy should provide a more accurate assessment based on the best available information for marine mammals and the locations and scheduled times of its activities. Therefore, the Commission again recommends that NMFS require the Navy to use spatially and temporally dynamic simulation models rather than simple probability calculations to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedoes, unmanned underwater vehicles and use of expended munitions, ordnance, and other devices).

Mitigation and monitoring measures

Ranges to impact criteria—Many of the proposed activities involve mitigation measures that currently are being implemented in accordance with previous environmental planning documents, regulations, or consultations. Most of the current mitigation zones for activities involving acoustic (e.g., mid- and high-frequency active sonar) or explosive sources (e.g., underwater detonations, explosive sonobuoys, surface detonations) were designed originally to reduce the potential for onset of TTS. For the LOA application, the Navy revised its acoustic propagation models by updating hearing criteria and thresholds and marine mammal density and depth data. Based on the updated information, the models now predict that for certain activities the ranges to onset of TTS are much larger than those estimated previously. Due to the ineffectiveness and unacceptable operational impacts associated with mitigating those large areas, the Navy is unable to mitigate for onset of TTS for every activity. For that reason, it proposes to base its mitigation zones for each activity on avoiding or reducing PTS.

Table 11-1 in the LOA application lists the Navy's predicted distances or ranges over which PTS and TTS might occur and the recommended mitigation zones. Rather than include all sources, the table presents sound sources categorized by a representative source type within a source bin (e.g., Bin MF1: SQS-53 antisubmarine warfare hull-mounted sonar) and provides average and maximum distances from the sound source at which PTS could be expected to occur and the average range at which TTS could be expected to occur. Chapter 6 of the LOA application also includes tables listing various ranges. However, the tables in Chapter 6 include (1) only a subset of the proposed activities (6 of the 11 explosive activities analyzed, Table 6-12), some of which are not relevant to MITT (Bin E7), (2) the average rather than maximum ranges (Table 6-12), (3) nominal values for deep water offshore areas, not specific to MITT (Table 6-12), and (4) values that are not consistent with Table 11-1. The Commission is unsure why the Navy would include a table that was not relevant or applicable to MITT, especially for activities such as underwater detonations that would occur in shallow-nearshore waters (Bins E5 and E6[2]) rather than deep waters. In addition, the LOA application does not provide the ranges to PTS for acoustic sources for more than 1 ping

[2] Bin E6 is missing from Table 6-12.

(Table 6-7), as it does for TTS (i.e., 1, 5, and 10 pings; Table 6-8). Instead, the Navy assumed that it was unlikely that marine mammals could maintain a speed of 10 knots parallel to the ship and receive adequate energy over successive pings that would result in PTS. Further, the Navy indicated in Table 6-7 that the ranges to PTS for acoustic sources were "within representative ocean acoustic environments", which the Commission assumes as not necessarily within MITT (similar to Table 6-9[3]).

The Navy noted that the activity-specific mitigation zones in Table 11-1[4] are based on the longest range for all the functional hearing groups. Therefore, the Navy indicated the mitigation zones are even more protective for the remaining functional hearing groups (i.e., low- and mid-frequency cetaceans). However, with Bin E3 as an example, the Commission notes that Table 6.12 indicates the average zone to TTS is 500 m for high-frequency cetaceans, but that the longest average range to TTS is 265 m and the recommended mitigation zone is 320 m in Table 11-1, neither of which are protective nor precautionary. Furthermore, the ranges listed in Table 6-12 are based on deep-water offshore areas, not shallow-water nearshore areas where some activities (e.g., Bins E5 and E6) would occur. Sound can propagate greater distances in shallower water. Data specific to MITT are essential, especially for shallow-water nearshore areas, for determining sound propagation. Absent MITT-specific information, the LOA application process is not fully transparent and the Commission and public cannot comment on the appropriateness of the proposed mitigation zones. To address those shortcomings, the Commission recommends that NMFS require the Navy to provide the predicted average and maximum ranges for all impact criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), for all activities (i.e., based on the activity category and representative source bins and include ranges for more than 1 ping), and for all functional hearing groups of marine mammals within MITT representative environments (including shallow-water nearshore areas).

Passive and active acoustic monitoring—The Navy indicated in its LOA application that the use of lookouts (i.e., observers) is expected to increase the likelihood of detecting marine mammals at the surface, but it also noted that it is unlikely that using lookouts would be able to help avoid impacts on all species entirely due to the inherent limitations of sighting marine mammals. The Commission agrees and has made numerous recommendations to the Navy in previous letters to characterize the effectiveness of visual observation. For a number of years, the Navy has been working with collaborators at the University of St. Andrews to study observer effectiveness. Although the data are preliminary[5], the marine mammal observers (MMOs) had sighted at least three marine mammals at distances 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). Further, MMOs have reported marine mammal sightings not observed by Navy lookouts to the Officer of the Deck, presumably to implement mitigation measures—however details regarding those reports or raw sightings data were not provided to confirm (Department of the Navy 2010). The

[3] Table 6-9 indicated that the values were nominal and not specific to the study area.
[4] The Navy indicated that those zones for a majority of activities are driven by either the high-frequency cetaceans or the sea turtle functional hearing groups.
[5] The Navy noted in the Northwest Training and Testing draft environmental impact statement (NWTT DEIS) that while data were collected as part of a proof-of-concept phase, those data are not fairly comparable as protocols were being changed and assessed, nor are those data statistically significant. The Commission agrees that the data are preliminary and may not be statistically significant, but the basic information they provide is useful.

Commission believes that these studies will be very informative once completed, but that a precautionary approach should be taken in the interim.

Therefore, the Commission believes that the Navy should supplement its visual monitoring efforts with other measures rather than simply reducing the size of the zones it plans to monitor. The Navy did propose to supplement visual monitoring using passive acoustics during activities that generate impulsive sounds (i.e., primarily explosives) but not during the use of low-, mid-, and high-frequency active sonar. The Navy already uses visual, passive acoustic, and active acoustic monitoring during Surveillance Towed Array Sensor System Low Frequency Active[6] sonar activities to augment its mitigation efforts over large areas. Therefore, it is not clear why the Navy did not propose to use those same monitoring methods as part of its mitigation measures for the other activities described in its LOA application. To ensure effective mitigation and monitoring, the Commission recommends that NMFS require the Navy to use passive and active acoustics, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that could cause PTS, injury, or mortality beyond those explosive activities for which passive acoustic monitoring already was proposed.

Clearance time for deep-diving species—The Navy has proposed to cease acoustic activities (i.e., active sonar transmissions, Bin MF1) when a marine mammal is detected within the mitigation zone. This raises the issue of when those activities should resume. According to the LOA application, those acoustic activities would resume when (1) the animal has been observed exiting the mitigation zone, (2) the animal has been thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes, (4) the ship has transited more than 1.8 km beyond the location of the last sighting, or (5) the ship concludes that dolphins are deliberately closing in on the ship to ride the ship's bow wave (and there are no other marine mammal sightings within the mitigation zone). The Commission questions some of those requirements when the position of the marine mammal is unknown. The key consideration is the position of the marine mammal relative to the sound source, which is best estimated as a function of the marine mammal's position when first sighted and the speed and heading of both the vessel and the marine mammal. If the vessel and marine mammal are not moving in the same direction, then the marine mammal may leave the mitigation zone relatively quickly. However, if they are moving in the same direction, then the marine mammal may remain within the mitigation zone for a prolonged period. Unless the marine mammal is resighted leaving or already outside the mitigation zone, the Navy should not resume its activity until it has had a reasonable chance of verifying that it can do so without further impacting the marine mammal. The delay should take into account that (1) a marine mammal may remain underwater where it is not visible, (2) it may change its heading and speed in response to a vessel or sound source, and (3) visual observation alone may not be sufficient to determine a marine mammal's position relative to a vessel or sound source after the initial sighting, unless the marine mammal surfaces again and is observed.

The dive time of a sighted marine mammal is a central consideration whenever mitigation measures depend on visual observation. For some medium-sized and large cetaceans, the proposed 30-minute pause may be inadequate, sometimes markedly so. Beaked and sperm whales, in particular, can remain submerged for periods far exceeding 30 minutes. Blainville's and Cuvier's

[6] SURTASS LFA

beaked whales dive to considerable depths (> 1,400 m) and can remain submerged for more than 80 minutes (Baird et al. 2008). The grand mean dive duration for those species of beaked whales during foraging dives is approximately 60 minutes (51.3 and 64.5 minutes for Blainville's and Cuvier's beaked whales, respectively; Baird pers. comm.). Sperm whales also dive to great depths and can remain submerged for up to 55 minutes (Drouot et al. 2004), with a grand mean dive time of approximately 45 minutes (Watwood et al. 2006). If they continue foraging in the same area as a stationary source and that source is turned on after only 30 minutes, then beaked whales and sperm whales could be exposed to sound levels sufficient to cause Level A harassment.

In addition, lookouts may not detect marine mammals each time they return to the surface, especially cryptic species such as beaked whales, which are difficult to detect even under ideal conditions. Barlow (1999) found that "[a]ccounting for both submerged animals and animals that are otherwise missed by the observers in excellent survey conditions, only 23 percent of Cuvier's beaked whales and 45 percent of *Mesoplodon* beaked whales are estimated to be seen on ship surveys if they are located directly on the survey trackline." Therefore, after a shutdown, the Commission recommends that NMFS require the Navy to use a second clearance time category of 60 minutes for deep-diving species (i.e., beaked whales and sperm whales) if the animal has not been observed exiting the mitigation zone.

Underwater detonations involving time-delay firing devices—For underwater detonations that involve time-delay firing devices, the Navy proposed to use a 915-m mitigation zone. The Navy's mitigation measures for underwater detonations involving time-delay firing devices at other ranges or study areas have been based on the explosive weight of the charge, a time delay to detonation of up to 10 minutes, an average swim speed for dolphins of 3 knots, and an added buffer to account for marine mammals that may be transiting at speeds faster than the average. The Navy indicated that the current mitigation zone for a 10-lb net explosive weight charge using a 10-minute time delay was 1,280 m. However, the Navy proposes to detonate charges up to 20 lbs. net explosive weight. Therefore, the mitigation zone of 915 m appears insufficient for not only a 10-lb charge with a 10-minute delay but also a 20-lb charge.

Further, the Navy has proposed to decrease the number of lookouts currently used for mine neutralization activities at other ranges or study areas using diver-placed time-delay firing devices, because it believes that the measure is impractical to implement and is currently resulting in an unacceptable impact on military readiness. In the HSTT FEIS, the Navy stated that the use of more than two boats for observation during those activities presents an unacceptable impact to readiness due to limited personnel resources. It also indicated that the reduction in the number of lookouts caused a corresponding decrease in the size of the mitigation zone to 915 m, because that is the maximum distance that lookouts in two small boats can observe realistically. As previously noted, in the LOA application, the Navy did not provide the ranges to the various thresholds for mine neutralization activities that use time-delay firing devices (lack of Bin E-6 in Table 6-12), limiting the ability of the Commission and public to evaluate the proposed 915-m mitigation zone.

The Navy should have determined the mitigation zone for underwater detonations that involve time-delay firing devices based on sound propagation in the shallow-water nearshore environment for the relevant marine mammal functional hearing groups, the maximum charge weight (20 lbs.), maximum time delay that would be used (e.g., 10 minutes), and the average swim

speed of the fastest group of marine mammals expected to occur in the area (e.g., mid-frequency[7] and high-frequency cetaceans). Until such time that those data and analyses are available, the Commission and the public cannot comment on the appropriateness or effectiveness of the mitigation measure. Therefore, the Commission recommends that NMFS require the Navy to (1) provide the range to effects for all impact criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality) for underwater detonations that involve time-delay firing devices based on sound propagation in shallow-water nearshore environments for the associated marine mammal functional hearing groups and (2) use those data coupled with the maximum charge weight and average swim speed of the fastest group of marine mammals as the basis for the mitigation zone for underwater detonations that involve time-delay firing devices—if NMFS does not require the Navy to adjust its mitigation zones, then it should authorize the numbers of takes for Level A harassment and mortality based on the possibility that marine mammals could be present in the mitigation zone when the explosives detonate and based on updated, more realistic swim speeds.

Monitoring plan

In 2009 the Navy, in collaboration with NMFS, developed its Integrated Comprehensive Monitoring Program (ICMP). The purpose of the ICMP was to coordinate monitoring efforts across all regions and allocate the most appropriate level and type of monitoring effort for each range complex based on a set of standardized objectives, regional expertise, and resource availability. Although the ICMP does not identify specific monitoring or field projects, it was designed to provide a flexible, scalable, and adaptable framework for such projects using adaptive management and strategic planning processes that periodically assess progress and reevaluate objectives.

The Navy and NMFS have been moving away from range-specific monitoring plans that establish specific monitoring requirements for each range complex based on a set of effort-based metrics (e.g., 20 days of aerial survey) towards more hypothesis-driven, region-specific plans. That approach was based on an evaluation of the Navy's current monitoring approaches conducted by a scientific advisory group early in 2011. The advisory group provided recommendations to be used in developing a strategic plan. In late 2012, the Navy drafted that plan to (1) establish a more transparent framework for evaluating and implementing monitoring efforts across the Navy's range complexes and study areas and (2) serve as guidance for determining how to most efficiently and effectively invest resources for monitoring marine species to address the top-level goals of the ICMP and meet the monitoring requirements of the MMPA.

Because the strategic planning process described by the Navy is only a framework, it does not specify (1) timeframes during which various steps have occurred or would occur (i.e., identifying overarching objectives, developing monitoring project concepts, selecting the projects, and implementing them), (2) hypotheses to be tested or details regarding individual monitoring projects, or (3) project participants and responsibilities (it merely states that NMFS and Commission "may be involved" through the adaptive management process). The Commission fully supports a move toward more hypothesis-driven monitoring projects and a more transparent framework for

[7] The Commission continues to believe that the use of 3 knots as an average swim speed is inaccurate and inadequate for mid-frequency cetaceans (see Au and Perryman 1982, Lockyer and Morris 1987, Mate et al. 1995, Ridoux et al. 1997, Rohr et al. 1998, Rohr and Fish 2004).

designing and implementing those projects. However, the Navy also must provide sufficient detail to enable NMFS, the Commission, and the public to assess how it will meet the applicable monitoring requirements.

Section 101(a)(5)(A) of the MMPA requires NMFS, when issuing incidental take regulations, to set forth "requirements pertaining to the monitoring and reporting of such taking." Further, NMFS's implementing regulations at 50 C.F.R. 216.104 (a)(13) specify that requests for letters of authorization must include suggested means of accomplishing the necessary monitoring and reporting that will (1) result in increased knowledge of the species and (2) document the level of taking or impacts on populations of marine mammals that are expected to be present. The Navy indicated that in March 2012 it updated its MIRC monitoring plan for fiscal years 2012 through 2015. However, the Navy did not include any specifics on the monitoring plan that would be implemented under the proposed regulations. The Navy merely indicated that specific allocation of monitoring (effort, studies, and species) within the MITT study area starting in 2015 would be contained in a monitoring plan to be developed in cooperation with NMFS. At this time, the Commission is not aware of a draft monitoring plan.

The Commission does not believe that the information provided either by the Navy in its application and associated documents, or by NMFS in its proposed regulations, satisfies the statutory or implementing regulatory requirements pertaining to monitoring. Although the framework provided by the ICMP and current monitoring plans are available and the strategic planning process is transparent, details regarding the monitoring plan for the proposed regulations are not available for the Commission and the public to provide informed comments. As such, the Commission recommends that NMFS require the Navy to submit a proposed monitoring plan for the MITT study area for public review and comment prior to issuance of the final regulations.

Request for Level A harassment and mortality takes

The Navy proposed an additional post-model analysis of acoustic and explosive effects to include (1) animal avoidance of repeated sound exposures, (2) sensitive species avoidance of areas of activity before a sound source or explosive is used, and (3) effective implementation of mitigation measures. That analysis effectively reduced the model-estimated numbers of Level A harassment (i.e., PTS and injury) and mortality takes.

The Navy assumed that marine mammals likely would avoid repeated high level exposures to a sound source that could result in injuries (i.e., PTS). It therefore adjusted its estimated numbers of takes to account for marine mammals swimming away from a sonar or other active source and away from multiple explosions to avoid repeated high-level sound exposures. The Navy also assumed that beaked whales would avoid certain training and testing activity areas because of high levels of vessel or aircraft traffic before those activities. For those types of activities, the Navy appears to have reduced the model-estimated takes from Level A harassment (i.e., PTS) to Level B harassment (i.e., TTS) during use of sonar and other active acoustic sources and from mortality to Level A harassment (i.e., injury and/or PTS)[8] during use of explosive sources. The Commission recognizes that, depending on conditions, marine mammals may avoid areas of excessive sound or activity.

[8] It is unclear, but the Navy may have reduced further the Level A harassment takes to Level B harassment (i.e., TTS) during the use of explosive sources.

Indeed, one of the concerns regarding sound-related disturbance is that it causes marine mammals to abandon important habitat on a long-term or even permanent basis. That being said, the Commission knows of no scientifically established basis for predicting the extent to which marine mammals will abandon their habitat based on the presence of vessels or aircraft. That would be essential information for adjusting the estimated numbers of takes.

As an example, the Navy indicated that beaked whales that were model-estimated to be within range of the mortality threshold were assumed to avoid the activity for missile exercises (air-to-surface; see Table 3.4-20 in the DEIS). But in Chapter 5 of the DEIS, the Navy indicated that missile exercises involve the aircraft firing munitions at a target location typically up to 27 km away (and infrequently at ranges up to 138 km away). When an aircraft is conducting the exercise, it can travel close to the intended impact area so that it can be visually observed. However, the Navy indicated that there is a chance that animals could enter the impact area after the visual observations have been completed and the activity has commenced. The Commission understands that to mean the aircraft clears the zone around the target and then travels to its firing location to commence the activity. Therefore, the Commission is unsure why the Navy would reduce any mortality or Level A harassment take estimates based on mitigation measures that are followed by a time lag before the activities actually commence, which could allow for the animals to enter the mitigation zone around the target.

The Navy also indicated that its post-model analysis considered the potential for highly effective mitigation to prevent Level A harassment from exposure to sonar and other active acoustic sources, as well as Level A harassment and mortality from exposure to explosive sources. Clearly, the purpose of mitigation measures is to reduce the number and severity of takes. However, the effectiveness of the Navy's mitigation measures has not been demonstrated and remains uncertain. This is an issue that the Commission has raised many times in the past, and the Navy has recognized the need to assess the effectiveness of its mitigation measures in its Integrated Comprehensive Monitoring Program, current DEIS, and LOA application. That application stated that although the use of lookouts is expected to increase the likelihood that marine species would be detected at the water's surface, it is unlikely that using those lookouts would help avoid impacts to all species because of the inherent limitations of visual monitoring.

According to data in the monitoring reports mentioned previously (Department of the Navy 2010, 2012), the effectiveness of the lookouts has yet to be determined. However, the Navy proposed to adjust its take estimates based on both mitigation effectiveness scores and g(0)—the probability that an animal on a vessel's or aircraft's track line will be detected. According to its proposed approach, for each species the Navy would multiply a mitigation effectiveness score and a g(0) to estimate the percentage of the subject species that would be observed by lookouts and for which mitigation would be implemented, thus reducing the estimated numbers of marine mammal takes for Level A harassment and mortality (explosive sources only). The Navy would reduce the estimated numbers of Level A harassment and mortality takes for that species to Level B and/or Level A harassment takes, respectively.

To implement that approach, the Navy assigned mitigation effectiveness scores of—

1 if the entire mitigation zone can be observed visually on a continuous basis based on the surveillance platform(s), number of lookouts, and size of the range to effects zone;

0.5 if (1) over half of the mitigation zone can be observed visually on a continuous basis, (2) there is one or more of the scenarios within the activity for which the mitigation zone cannot be observed visually on a continuous basis (but the range to effects zone can be observed visually for the majority of the scenarios), or (3) the mitigation zone can be continuously observed, but the activity may occur at night; or

N/A if (1) less than half of the mitigation zone can be observed visually on a continuous basis or (2) the mitigation zone cannot be observed visually on a continuous basis during most of the scenarios within the activity due to the type of surveillance platform(s), number of lookouts, and size of the mitigation zone.

The difficulty with this approach is in determining the appropriate adjustment factors. Again, the information needed to judge effectiveness has not been made available. In addition, the Navy has not provided the criteria (i.e., the numbers and types of surveillance platforms, numbers of lookouts, and sizes of the respective zones) needed to elicit the three mitigation effectiveness scores. Moreover, the coverage afforded by the mitigation measures is not adequate to ensure that those measures will be effective. That is, measures of effort (i.e., numbers and types of surveillance platforms, numbers of lookouts, and sizes of mitigation zones) are not necessarily measures of, or even linked to, effectiveness. The Navy has not yet demonstrated that such measures of effort are synonymous with effectiveness nor has it demonstrated the effectiveness of the visual monitoring measures, as discussed previously[9]. Therefore, it is unclear what basis the Navy would have to assign the mitigation effectiveness scores, as the use of those scores to reduce the numbers of takes is unsubstantiated.

The information that the Navy provided in Chapter 5 of its DEIS (which is not included in the LOA application) regarding the effectiveness of various mitigation measures does not necessarily comport with its determination of mitigation effectiveness scores. For example, the Navy indicated that small- and medium-caliber gunnery exercises could involve a participating vessel or aircraft firing munitions at a target location that may be up to 3.7 km away (although it also indicated that the platforms typically are much closer). The Commission is unclear how the Navy would implement a shutdown or delay if the mitigation zone is 183 m and is being observed from up to 3.7 km away. It also stated that large vessels or aircraft platforms would provide a more effective observation platform for lookouts than small boats, but it is highly unlikely that anything but a whale blow or large pod of dolphins would be seen at distances around 3.7 km. Nevertheless, the Navy then used the highest effectiveness score of 1 for lookouts to observe mid- and low-frequency cetaceans (except beaked whales) from aircraft, large vessels, and small boats (Table 6-14 in the LOA application). Those effectiveness scores again seem to be measures of effort rather than of true effectiveness.

In addition, the Navy is inconsistent in its use of the terms "range to effects zone" and "mitigation zone", which are not the same (see Table 11-1 of the LOA application). More importantly, some of the mitigation zones may be smaller than the estimated range to effects zones. For example, the Navy proposed a mitigation zone of 183 m after a 10 dB reduction in power for its

[9] The Navy further reinforced that fact in its NWTT DEIS when stating the Navy believes that it is improper to use the proof-of-concept data to draw any conclusions on the effectiveness of Navy lookouts.

most powerful active acoustic sources (e.g., Bin MF1) and assumed that marine mammals would leave the area near the sound source after the first 3–4 pings. However, the Navy did not present data on the range to onset PTS for more than 1 ping and only provided data for "representative ocean acoustic environments", which may or may not be representative of shallow-water nearshore areas in MITT. It also is unclear how the Navy evaluated sources that have a typical duty cycle of several pings per minute (i.e., dipping sonar), as the range to onset PTS for those sources appear to be based on 1 ping as well (Table 11-1). Furthermore, the Navy provided both the average and maximum ranges to PTS in Table 11-1 but did not clarify which range to effects zone it considered for the mitigation effectiveness scores. For small- and medium-caliber gunnery exercises that involve a participating vessel, those zones range from 76 m for the average range to effects zone to 167 m for the maximum range to effects zone with an overall mitigation zone of 183 m. Without the relevant information, mitigation based on those zones cannot be evaluated fully or deemed effective and assigning mitigation effectiveness scores is inappropriate.

The Navy used numerous references to estimate species-specific g(0)s (Table 6-5). Those sources were based on both vessel- and aircraft-based scientific surveys of marine mammals. It also indicated that various factors are involved in estimating g(0), including sightability and detectability of the animal (e.g., species-specific behavior and appearance, school size, blow characteristics, dive characteristics, and dive interval), viewing conditions (e.g., sea state, wind speed, wind direction, sea swell, and glare), the observer's ability to detect animals (e.g., experience, fatigue, and concentration), and platform characteristics (e.g., pitch, roll, yaw, speed, and height above water). In the DEIS application, the Navy noted that due to the various detection probabilities, levels of experience, and variability of sighting conditions, lookouts would not always be effective at avoiding impacts on all species. Yet it based its g(0) estimates on data from seasoned researchers conducting scientific surveys, not on data from Navy lookouts whose effectiveness as observers has yet to be determined. The Commission recommended earlier in this letter that the Navy supplement its mitigation and monitoring measures because the observer effectiveness study has yet to be completed or reviewed. It therefore would be inappropriate for the Navy to reduce the numbers of takes based on the proposed post-analysis approach because, as the Navy has described its approach, it does not address the issue of observer effectiveness in developing mitigation effectiveness scores or g(0) values.

Further, the Navy used g(0) values from surveys conducted in areas off the west coast of the United States during Beaufort sea states of 0–5 (Barlow and Forney 2007, Barlow 2010[10]), but sea states in MITT can range from 0–7 with heavy winds and/or large swells up to 3 m in height (Ligon et al. 2010, Oleson and Hill 2010, Fulling et al. 2011, HDR 2011, Hill et al. 2011, HDR 2012). Therefore, the Commission believes it is not appropriate to use g(0) values from areas off the west coast of the United States as surrogates for g(0) values in MITT. Moreover, Fulling et al. (2011) indicated that failure to detect or verify species of the more cryptic cetaceans (i.e., *Kogia* spp., minke whales, and beaked whales) was not surprising as more than half of the survey was conducted in Beaufort sea states greater than 4 and sighting those species is difficult even when sighting conditions are optimal (sea state less than 2). Less than optimal sighting conditions in Guam and the CNMI have contributed to the low sighting rate of marine mammals during research surveys and

[10] The Navy also indicated it used Carretta et al. 2010 as a source for g(0) values in MITT. However, that document is the 2009 stock assessment report for the Pacific region and does not contain g(0) values for species that would occur in MITT—g(0) values were provided for the harbor porpoise, which does not occur in MITT.

also would contribute to a low sighting rate of Navy lookouts, thus diminishing their effectiveness. Lastly, the Navy used greater g(0) values for vessel than aircraft platforms for certain species. The assumption that vessel-based observers are more effective may be true for areas off the west coast of the United States, but Mobley (2007) observed numerous cryptic species (*Kogia* spp. and beaked whales) during aerial surveys in areas more relevant to the DEIS that were not observed during the Fulling et al. (2011) or the HDR (2011) vessel surveys. Again, this difference was likely due to the better sighting conditions during the aerial surveys in Guam and the CNMI. Thus, the g(0) values from Barlow and Forney (2007) and Barlow (2010) are not directly applicable to MITT. Based on all of these concerns, the Commission recommends that NMFS authorize the total numbers of model-estimated Level A harassment and mortality takes rather than allowing the Navy to reduce the estimated numbers of Level A harassment and mortality takes based on the Navy's proposed post-model analysis.

Possible errors in the take tables

The Commission believes some possible errors may be evident in the take tables provided in the Navy's LOA application, DEIS, and MITT technical report that includes the raw modeled data (MITT-TR; Department of the Navy 2013a). For example, in the MITT-TR, the model-estimated takes for TTS exceed those for behavior for both dwarf (11,112 and 277 takes, respectively) and pygmy sperm whales[11] (4,360 and 98 takes, respectively) exposed to non-impulsive sources (acoustic sources) during training events under Alternative 1[12] (Table 15 in Department of the Navy 2013a), but not for any other odontocetes. A similar trend was observed for mysticetes. The Commission is unsure how the takes would be so much greater for the higher TTS threshold than the lower behavior threshold.

One possible explanation is that the Navy used the weighted threshold of 152 dB re 1 μPa^2-sec rather than the unweighted threshold of 176 dB re 1 μPa-sec[13] as the upper limit of BRF_2[14] (Finneran and Jenkins 2012) for high-frequency cetaceans other than harbor porpoises. If that is the case, then the estimated numbers of takes for behavior would have been underestimated. It would not be appropriate for the Navy to use a weighted threshold based on a Type II weighting function when the Navy indicated that it applied the Type I weighting functions (as normally are used in concert with either unweighted or M-weighted thresholds) to the estimated exposures—this logic would apply to mid- and low-frequency cetaceans as well. The Navy did not specify what it used as the upper limit of the BRF_2, but in previous environmental compliance documents for its Tactical Training Theater Assessment and Planning Program (TAP)[15], the Commission believes that the Navy assumed the pings emitted from the sound sources were 1 sec in length, thus the sound pressure level and sound exposure level were equivalent. That meant that the upper limit of BRF_2 as used in previous TAP documents was 195 dB re 1 μPa, which equated to 195 dB re 1 μPa^2-sec and the delineation of behavior and TTS takes occurred at 195. The assumption of a 1-sec ping may be appropriate for some sound sources but likely is not appropriate for all. Therefore, the Commission

[11] Finneran and Jenkins (2012) consider *Kogia* spp. high-frequency cetaceans.
[12] Alternative 1 in the DEIS and MITT-TR is the Preferred Alternative, as discussed in the LOA application.
[13] Based on the Commission's rationale in the criteria and thresholds section of this letter.
[14] BRF_2 is used for all mid- and high-frequency cetaceans but beaked whales and harbor porpoises; while BRF_1 is used for low-frequency cetaceans.
[15] The environmental compliance documents under TAP are currently in place, including the final regulations and associated letters of authorization under the MMPA that expire in 2015.

recommends that NMFS require the Navy to (1) describe what it used as the upper limit of BRF_1 for low-frequency cetaceans and the upper limits of BRF_2 for both mid- and high-frequency cetaceans, including if it assumed a 1-sec ping for all sources and (2) if the upper limits of the BRFs were based on weighted thresholds, use the unweighted or M-weighted thresholds of 195 dB re 1 μPa^2-sec for low- and mid-frequency cetaceans and 176 dB re 1 μPa^2-sec for high-frequency cetaceans to revise its behavior take estimates for all marine mammals exposed to acoustic sources.

The Navy also appears to be rounding all take numbers from the MITT-TR down in its LOA application and DEIS rather than rounding to the nearest whole number, which the Commission believes was the Navy's policy for species listed under the MMPA in its environmental compliance documents for its TAP Program. When determining the population within a modeling area in its MITT-TR, the Navy indicated the total true population is (1) rounded to 1 if the total true population is equal to or greater than 0.05 but less than 1.0 and (2) rounded to the nearest whole number if the total true population is equal to or greater than 1.0. For example, the model-estimated non-TTS (behavioral) takes for rough-toothed dolphins exposed to non-impulsive sources during training events under Alternative 1 in the MITT-TR was 548.84 (Table 15 in Department of the Navy 2013a), but was rounded down to 548 in the LOA application (Table 5.2[16]) and DEIS (Table 3.4-17). It is unclear why the Navy wouldn't be rounding to the nearest whole number in its LOA application and DEIS. Accordingly, the Commission recommends that NMFS require the Navy to round its takes, based on those takes in the MITT-TR tables, to the nearest whole number or zero in all of its take tables and then authorize those numbers of takes.

The Commission appreciates the opportunity to provide comments on the Navy's LOA application. Please contact me if you have questions concerning the Commission's recommendations or rationale.

Sincerely,

Rebecca J. Lent, Ph.D.
Executive Director

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[16] The Commission understands that Table 5-2 includes takes (741) for exposure to (1) impulsive sources during both training (122.78 and 548.18 for TTS and non-TTS, respectively) and testing (28.21 and 43.18 for TTS and non-TTS respectively) events and (2) non-impulsive sources during both training and testing events (0.01 for TTS and/or behavior, which would equal 0).

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