MARINE MAMMAL COMMISSION

20 February 2014

Naval Facilities Engineering Command Northwest
Attention: Ms. Kimberly Kler-NWTT EIS/OEIS Project Manager
1101 Tautog Circle
Suite 203
Silverdale, Washington 98315-1101

Dear Ms. Kler:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Navy's Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) for training and research, development, test, and evaluation activities to be conducted from 2015 to 2020 within the Northwest Training and Testing study area (NWTT; 79 Fed. Reg. 4158). The DEIS discusses the impacts of those activities on marine mammals off the northwest coast of the United States, off the southwest coast of Canada, and in southeast Alaska. 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, 24 October 2013 Commission letters). In concert with this letter, the Commission is providing comments to the National Marine Fisheries Service (NMFS) regarding the Navy's application for a letter of authorization (LOA).

RECOMMENDATIONS

The Marine Mammal Commission recommends that, prior to issuing the final environmental impact statement/overseas impact statement, the Navy—

- revise its DEIS by expanding the range of alternatives under consideration to include at least one with lesser levels of training and testing activities;
- (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;
- (1) incorporate data from Raum-Suryan et al. (2005) and Call et al. (2007) and consult with scientists at the National Marine Mammal Laboratory (NMML) regarding unpublished data to revise the areas used in estimating Steller sea lion densities in the offshore and Western Behm Canal areas, (2) incorporate data from Robinson et al. (2012) into the areas used in estimating northern elephant seal densities in the offshore and Western Behm Canal areas, (3) incorporate data from Weise et al. (2006) and consult with scientists at NMML regarding unpublished data to revise the areas used in estimating California sea lion densities in the offshore area, and (4) incorporate data from Ream et al. (2005), Lea et al. (2009), and Melin et al. (2012) and consult with scientists at NMML regarding unpublished data to revise the areas used in estimating northern fur seal densities in the offshore and Western Behm Canal

areas—further, movement and dispersion data specific to the NWTT areas from tagged pinnipeds could be scaled to the population for a better estimate of density, if those data are available from NMML;

- revise its abundance estimates to include (1) data from Allen and Angliss (2013) and Carretta et al. (2013) to determine Steller and northern fur seal densities in both the offshore and Western Behm Canal areas and (2) updated data for harbor seals in the Western Behm Canal area, if available;
- (1) use harbor seal haul-out correction factors of 1.50 and 1.57 for the offshore and inland water areas, respectively, rather than a pooled correction factor of 1.53 and (2) use a haul-out correction factor of 1.47 to determine the overall abundance of harbor seals for the Western Behm Canal area and apply a correction of 0.32 to determine the proportion of the overall abundance at sea rather than applying a single correction factor of 0.198;
- include in either its DEIS or supporting documents (Department of the Navy 2014b) the method(s) by which species-specific densities were calculated for each area and each season and cite the primary literature from which the data originated;
- (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 those decreases in 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;
- (1) use 171 dB re 1 μPa^2-sec as the TTS threshold for phocids exposed to explosive sources and (2) based on that decrease in the TTS threshold for phocids, adjust the PTS and behavioral thresholds by increasing the TTS threshold by 15 and decreasing the TTS threshold by 5 dB, respectively;
- use its 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 expended munitions, ordnance, and other devices);
- 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 including ranges for more than 1 ping), and for all functional hearing groups of marine mammals within the three NWTT areas (i.e., offshore, inland waters, and Western Behm Canal);
- 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 acoustics already was proposed;
- 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;

- (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 the shallow water nearshore environment for the relevant marine mammal functional hearing groups (i.e., mid- and high-frequency cetaceans and pinnipeds) 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 the Navy chooses not to adjust its mitigation zones, then it should estimate 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 on updated, more realistic swim speeds, which should be incorporated into its LOA application;
- (1) use the total numbers of model-estimated Level A harassment and mortality takes rather than reducing the estimated numbers of Level A harassment and mortality takes based on the Navy's proposed post-model analysis and (2) incorporate those take estimates into its LOA application;
- revise its DEIS to (1) include in its cumulative impacts analysis all potential risk factors, including those that are deemed individually minor but could be significant when considered collectively and (2) provide sufficient details to allow the reader to evaluate the utility of the Navy's conceptual framework for its cumulative impacts analysis;
- (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
- round its takes, based on those takes in the NWTT technical report tables, to the nearest whole number or zero in all of its take tables in the DEIS and LOA application.

BACKGROUND

The Navy proposes to conduct training and testing activities in the waters off northern California, Oregon, Washington, and British Columbia (including the Strait of Juan de Fuca and Puget Sound) and in Western Behm Canal in southeastern Alaska. 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, electromagnetic devices, high-energy lasers, vessels, underwater vehicles (including gliders), and aircraft.

RATIONALE

No Action Alternative

The Navy has chosen to use a continuation of current activities as the No Action Alternative. The Commission understands that choice and considers it reasonable as long as the environmental impacts of all major current activities have been assessed appropriately. However, the Commission has serious concerns regarding the selection of the other alternatives because, as a set, they do not satisfy the requirement under the Council on Environmental Quality (CEQ) guidance that the DEIS consider management of both greater and lesser intensity.

The Navy suggested in its DEIS that it need not consider any alternative under which training and testing activities would be reduced. Specifically, the Navy stated that such an alternative cannot be considered because it would not allow the Navy to meet its mandates under 10 U.S.C. § 5062. However, the guidance provided by CEQ on No Action Alternatives explains that—

> the regulations require the analysis of the no action alternative even if the agency is under a court order or legislative command to act. This analysis provides a benchmark, enabling decisionmakers to compare the magnitude of environmental effects of the action alternatives. It is also an example of a reasonable alternative outside the jurisdiction of the agency which must be analyzed.

Thus, even though the Navy may prefer a different alternative that enables it to meet fully its obligations under Title 10, such alternatives must be analyzed in the DEIS. Therefore, the Commission recommends that the Navy revise its DEIS by expanding the range of alternatives under consideration to include at least one with lesser levels of training and testing activities.

Uncertainty in density estimates

Uncertainty in general—The Navy estimated marine mammal densities in NWTT 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 2014b). The Navy noted that estimates from both RES models and extrapolated densities include a high degree of uncertainty (Department of the Navy 2014b), but it does not appear that the Navy included measures of uncertainty (i.e., standard deviation, coefficient of variation, etc.) in those estimates.

For NWTT, the Navy indicated that extrapolated density estimates from the Southwest Fisheries Science Center (SWFSC) data were considered more representative of expected densities than those generated from RES models[1]. The Navy stated that, in the absence of any other density data for various species that occur in the U.S. Northwest Offshore or the Canada Offshore stratum[2], density data from the SWFSC's Oregon/Washington stratum were used (Department of the Navy 2014b). Those data originated from areas south of the two offshore strata. For other species, such as Dall's porpoise, data from the SWFSC's Northern California stratum were applied to the Oregon/Washington and the U.S. Offshore strata. SWFSC's data also were collected in summer and fall but were used to estimate winter and spring densities for species expected to occur in winter

[1] The Commission is unsure how the Navy could determine that the extrapolated densities better represent the expected densities than densities from RES models in the absence of density data in those areas.
[2] For NWTT, the Navy delineated three different density areas (i.e., offshore, inland waters, and Western Behm Canal in Alaska), which were differentiated further into various strata within those areas.

and/or spring. In addition, some density estimates were based on (1) a single sighting, for which the Navy noted the confidence in the value was low and/or (2) f(0) and g(0) values derived from other surveys in the North Pacific[3] (Department of the Navy 2009). Further, for Dall's porpoise and minke whale densities for the inland waters of Washington, the Navy used density data from harbor porpoise surveys that then were prorated (i.e., scaled) based on harbor porpoise sightings (ManTech-SRS Technologies 2007). Man-Tech SRS Technologies (2007) emphasized that those estimates were subject to high levels of uncertainty and variability since the prorating method required several assumptions that could not be evaluated fully.

The Commission understands that density data are not available for all areas where or times when activities may occur and that when 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. The Navy did indicate 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 the Navy (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.

Pinniped densities—To estimate pinniped densities, the Navy primarily used sightings or abundance data divided by an area. In the offshore area, the Navy used the following areas for each species:

- for harbor seals that area was based on Calambokidis et al. (2004) reporting that seals occur within 40 km of the coastline;
- for Steller sea lions that area was based on the entire geographic range of the eastern stock;
- for elephant seals that area was based on the female foraging range (based on a figure in LeBoeuf et al. (2000)); and
- for California sea lions and northern fur seals those areas were based on "geographic area of occurrence."

The Commission is unsure if the latter area is represented by the total area of the NWTT offshore area, the actual area in which the animals occur or forage off the Pacific Northwest coast, or the entire range of the stock. To estimate the densities in Western Behm Canal for Steller sea lions, northern elephant seals, and northern fur seals, the Navy used the area of the Gulf of Alaska Large Marine Ecosystem[4] (Department of the Navy 2009[5]). For harbor seals in Western Behm Canal, the Navy used the area associated with haul-out sites within 35 km of the Navy's study area. Except for harbor seals, for which the Commission believes that the areas used to estimate densities in both the offshore and Western Behm Canal areas are appropriate, more representative data exist regarding areas of use for each of the other species.

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[3] For example, Waite (2003) did not provide survey-specific f(0) and g(0) values; therefore, those values originated from other surveys that occurred in the North Pacific.
[4] www.lme.noaa.gov
[5] The Department of the Navy (2009) density estimation methods were referenced by Department of the Navy (2010).

For Steller sea lions, Department of the Navy (2009) cited satellite telemetry data for dispersion and haul-out behavior of pups and dependent juveniles with females in Southeast Alaska from Raum-Suryan et al. (2004) and Call et al. (2007). However, it does not appear that the Navy used those data to define the area in which Steller sea lions occur. In addition, NMML has unpublished satellite telemetry data[6] that could be used to determine the areas of Steller sea lion occurrence for both the offshore and Western Behm canal areas. For elephant seals, Robinson et al. (2012) provided satellite telemetry data on dispersion and movements of female northern elephant seals similar to that of LeBoeuf et al. (2000). From a total of 297 deployments, the researchers collected data on 209 elephant seal tracks of which 195 originated from Año Nuevo Island (see Figure 6 in Robinson et al. (2012)). Those newer elephant seal data should be combined with the LeBoeuf et al. (2000) data to revise the Navy's area approximation for offshore densities. For California sea lions, Weise et al. (2006) determined that adult male California sea lions remained fairly close to shore but do venture farther out to sea when anomalous oceanic conditions occur, such as were observed in 2005. Although California sea lions were tracked only to southern Oregon by Weise et al. (2006), the Commission believes that unpublished data likely exist from sea lions tagged at San Miguel by NMML. Those unpublished data may better inform the range of California sea lions within the offshore area. Lastly, movements of northern fur seals have been investigated using satellite telemetry from adult females in the non-breeding season (Ream et al. 2005, Melin et al. 2012) and from pups (Lea et al. 2009). Those data, in addition to unpublished data from NMML, could be used to better define the areas in which fur seals occur in both the offshore and Western Behm Canal areas. Specifically, data regarding movements and dispersion of tagged fur seals in the two areas could be scaled to the population and be used for a better approximation of density in those areas. Accordingly, <u>the Commission recommends</u> that the Navy (1) incorporate data from Raum-Suryan et al. (2005) and Call et al. (2007) and consult with scientists at NMML[7] regarding unpublished data to revise the areas used in estimating Steller sea lion densities in the offshore and Western Behm Canal areas, (2) incorporate data from Robinson et al. (2012) into the areas used in estimating northern elephant seal densities in the offshore and Western Behm Canal areas, (3) incorporate data from Weise et al. (2006) and consult with scientists at NMML regarding unpublished data to revise the areas used in estimating California sea lion densities in the offshore area, and (4) incorporate data from Ream et al. (2005), Lea et al. (2009), and Melin et al. (2012) and consult with scientists at NMML regarding unpublished data to revise the areas used in estimating northern fur seal densities in the offshore and Western Behm Canal areas—further, movement and dispersion data specific to the study areas from tagged pinnipeds could be scaled to the population for a better estimate of density, if those data are available from NMML.

In general, the Navy used abundance estimates from stock assessment reports to estimate pinniped densities. Some of those estimates may be outdated or not considered best available science. The abundance estimates that the Navy used in both the offshore and Western Behm Canal areas have increased for Steller sea lions and decreased for northern fur seals (see Allen and Angliss (2013) and Carretta et al. (2013)) since reported in Department of the Navy (2009, 2014b). The Navy did indicate that updated abundance estimates for harbor seals would be available in 2010 or

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[6] The Commission understands it is difficult to determine densities when the best available data are not published. Accordingly, the Commission plans to recommend in its upcoming letter regarding the 2013 stock assessment reports that NMFS's Science Centers, including NMML, publish their data.

[7] The Commission can provide contact information for the appropriate scientists at NMML.

2011 (Department of the Navy 2010b), but it is unclear if the Navy tried to obtain those data and they are still unavailable or if the Navy has not updated the harbor seal density data since the Department of the Navy (2010) document. In either case, more current data likely are available for harbor seals since nearly four years have passed. Therefore, the Commission recommends that the Navy revise its abundance estimates to include (1) data from Allen and Angliss (2013) and Carretta et al. (2013) to determine Steller and northern fur seal densities in both the offshore and Western Behm Canal areas and (2) updated data for harbor seals in the Western Behm Canal area, if available.

To better estimate the densities of harbor seals in NWTT, the Navy applied correction factors to the abundance estimates in all three areas. A single "regional combined" haul-out correction factor of 1.53 from Huber et al. (2001) was applied to the abundance estimate for both offshore and inland Washington areas. However, Huber et al. (2001) also determined separate haul-out correction factors for the offshore and inland waters (i.e., 1.50 and 1.57, respectively). Those separate correction factors should have been used for the two areas. In addition, the Navy used a correction factor of 0.198 (Allen and Angliss 2010[8]) for the harbor seal abundance estimate in Western Behm Canal. The Commission believes the Navy misinterpreted that information. Simpkins et al. (2003) determined a haul-out correction factor of 1.198, which would account for seals at sea and not counted during a survey[9]. The proportion of seals hauled out would be 0.835 with 0.165 at sea (Simpkins et al. 2003). The abundance estimate, which was based on hauled out seals, should have been multiplied by the haul-out correction factor to determine the overall abundance. Then the overall abundance should have been reduced by the proportion at sea, which is the same method as the Navy used for its offshore density estimate.

Further, Withrow and Loughlin (1995) determined a haul-out correction factor of 1.74 for the same general area and at the same time of year as Simpkins et al. (2003). It is unclear why the correction factors differ so much, but the Commission believes that the Navy should use the mean of the two haul-out correction factors (1.47) to determine the overall abundance estimate for Western Behm Canal. The Navy then should reduce that overall abundance estimate by 0.32 (0.68would be the proportion of seals hauled out[10]) to determine the number of animals at sea. Accordingly, the Commission recommends that the Navy (1) use harbor seal haul-out correction factors of 1.50 and 1.57 for the offshore and inland water areas, respectively, rather than a pooled correction factor of 1.53 and (2) use a haul-out correction factor of 1.47 to determine the overall abundance of harbor seals for the Western Behm Canal area and apply a correction of 0.32 to determine the proportion of the overall abundance at sea rather than applying a single correction factor of 0.198.

Lack of transparency in density estimations—The Commission had a difficult time determining how some of the densities were calculated given the need to review multiple sources of information. For example, the Navy indicated in its density database technical report (Department of the Navy 2014b) that the densities of Cuvier's and Baird's beaked whales for Western Behm Canal were taken from Department of the Navy (2010). But Department of the Navy (2010) indicated that the densities

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[8] However, the haul-out correction factor originated in Simpkins et al. (2003).
[9] The correction factor to adjust an abundance estimate to account for seals in the water is the reciprocal of the proportion of tagged animals hauled out. That correction factor is not the same as the proportion of seals in the water.
[10] The reciprocal of the mean haul-out correction factor of 1.47 is 0.68, which is the proportion of seals hauled out. Therefore, 0.32 would be the proportion of seals in the water.

were calculated in Department of the Navy (2009) and were based on Waite (2003). In Department of the Navy (2009), the Navy stated that data from vessel surveys conducted by Waite (2003) yielded the stated densities. Further, various documents (e.g., Department of the Navy 2009, 2010, 2014b) use different delineations for seasons—some use the conventional four seasons, while others use warm and cold seasons. The Navy should have explained the method by which the densities were calculated for each area (for NWTT that would include each of the three density areas) and each season in Department of the Navy (2014b), as the current process is not transparent. Therefore, the Commission recommends that the Navy include in either its DEIS or supporting documents (Department of the Navy 2014b) the method(s) by which species-specific densities were calculated for each area and each season and cite the primary literature from which the data originated.

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. However, they only reduced the TTS threshold for high-frequency cetaceans by 18.3 rather than 19.4 dB (Table 4 in Finneran and Jenkins (2012)). 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[11], 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.

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

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, 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 factor, the Navy may have estimated the numbers of takes of marine mammals incorrectly. To address these concerns, <u>the Commission recommends</u> that the Navy (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 those decreases in 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.

For determining TTS thresholds for pinnipeds for underwater detonations, the Navy used data from Kastak et al. (2005) and extrapolation factors from Southall et al. (2007). Kastak et al. (2005) estimated the average SEL for onset-TTS for pinnipeds exposed to octave-band underwater sound centered at 2.5 kHz (i.e., mid-frequency sound). However, underwater detonations produce broadband sound in the low-frequency range. The Commission recognizes that the data provided by Kastak et al. (2005) may be the only data available, but it is unclear if those data provide an appropriate basis for estimating the relevant thresholds. More importantly, the extrapolation factors from Southall et al. (2007) were not stated specifically in the Navy's analysis for underwater detonations, but it appears that the Navy used 6 dB. As noted in the previous paragraph, Southall et al. (2007) seem to have used 6 dB as the extrapolation factor for determining PTS thresholds from TTS thresholds based on peak sound pressure levels, not for extrapolating from acoustic to explosive thresholds. Further, Southall et al. (2007) determined the TTS threshold for harbor seals exposed to pulsed sound (explosive sources) by using a correction factor of 12 dB to reduce the Type I threshold of 183 dB re 1 μPa^2-sec for mid-frequency cetaceans, which equates to 171 dB re 1 μPa^2-sec. The Commission believes that threshold of 171 dB re 1 μPa^2-sec should have been used by the Navy rather than the 177 dB re 1 μPa^2-sec. Further, as stated previously, the TTS thresholds serve as the basis for the PTS and behavioral thresholds and could have been underestimated. <u>Therefore, the Commission recommends</u> that the Navy (1) use 171 dB re 1 μPa^2-sec as the TTS threshold for phocids exposed to explosive sources and (2) based on that decrease in the TTS threshold for phocids, adjust the PTS and behavioral thresholds by increasing the TTS threshold by 15 and decreasing the TTS threshold by 5 dB, respectively.

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 I 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 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 testing activities involving vessel movement in the offshore area would increase by nearly 400 percent over the No Action Alternative (37 vs. 138 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 the Navy use its 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 expended munitions, ordnance, and other devices).

Mitigation and monitoring measures

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 DEIS, 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 5.3-2 in the DEIS 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 categorizes sound sources 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 3 of the DEIS also includes tables listing various ranges. However, the tables in Chapter 3 include (1) only a subset of the proposed activities, some of which are not relevant to NWTT, (2) the average rather than maximum ranges, and (3) nominal values for deep water offshore areas, not specific to NWTT (see Table 3.4-20). The Commission is unsure why the Navy would include a table that was not relevant or applicable to NWTT. In addition, the DEIS does not provide the ranges to PTS for acoustic sources for more than 1 ping (Table 3.4-10), as it does for TTS (i.e., 1, 5, and 10 pings; Table 3.4-11). Instead, the Navy assumed that marine mammals could not maintain a speed of 10 knots parallel the ship and receive adequate energy over successive pings to result in PTS. Further, the Navy indicated in Table 3.4-10 that the ranges to PTS for acoustic sources were "within representative ocean acoustic environments" and in Table 3.4-11 that the ranges to TTS for acoustic sources were "over a representative range of ocean environments", which the Commission assumes as not necessarily within NWTT (similar to Table 3.4-20).

The Navy stated that modeling for inland waters provides an overestimate of the range to effects because it cannot adequately account for the complex interactions of the sound energy into very shallow water and associated shorelines, the loss into dampening structures (i.e., such as adjacent pilings, jetties, or seawalls), or occasions when a ship or submarine is moored bow-in so that the sound is transmitted toward the nearby shoreline. Therefore, the Navy noted that the ranges in Table 5.2-3 would be even more protective for activities in the inland waters. The Commission agrees that in many cases the Navy's range estimates are more protective in inland waters, but that is not true in all cases. Situations occur in which sound can propagate greater distances in shallower water. Data specific to NWTT are essential, especially for inland waters[12] and Western Behm Canal where waters are shallower and bottom characteristics would be important for determining sound propagation. Further, the Navy did not propose to power down when pinnipeds were within various radii of the acoustic source. Rather, the Navy proposed to shut down when pinnipeds were at 90 m or less. The Commission believes that shutting down for pinnipeds likely would occur most often in either inland waters or in Western Behm Canal, which may not have been included in Tables 3.4-10, 11, and 20. Absent NWTT-specific information, the DEIS process is not fully transparent and the

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[12] Empirical sound propagation measurements have been obtained by Washington Department of Transportation and the Navy at Naval Base Kitsap, which could inform modeling of inland waters.

Commission and public cannot comment on the appropriateness of the proposed mitigation zones. To address those shortcomings, the Commission recommends that the Navy 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 including ranges for more than 1 ping), and for all functional hearing groups of marine mammals within the three NWTT areas (i.e., offshore, inland waters, and Western Behm Canal).

The Navy indicated in its DEIS that the use of lookouts (i.e., observers) would increase the likelihood of detecting marine mammals at the surface, but it also noted that it is unlikely that using lookouts will be able to help avoid impacts on all species entirely due to the inherent limitations of visually detecting 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. The Navy has noted in the 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. In one instance, 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 2010a). The 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 uses visual, passive acoustic, and active acoustic monitoring during Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) 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 DEIS. To ensure effective mitigation and monitoring, the Commission recommends that the Navy 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 acoustics already was proposed.

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 DEIS, 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 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, <u>the Commission recommends</u> that the Navy 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.

For underwater detonations that involve time-delay firing devices, the Navy proposed to use a 640-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 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 mentioned none of those factors in the DEIS. Rather, the Navy stated that only mid-frequency cetaceans and sea turtles are expected to occur in the area where the activity would occur (i.e., primarily close to shore and in shallow water) and the size of the zone was based on larger range to effect for sea turtles (page 5-36 in the DEIS). As previously noted, the Navy did not provide the ranges to the various thresholds for activities that occur in the inland waters in the current DEIS, limiting the Commission's and public's ability to evaluate the proposed 640-m mitigation zone. Further, it does not appear that the Navy included pinnipeds or high-frequency cetaceans when assessing the effectiveness of the mitigation zone. The Commission is unsure why pinnipeds and high-frequency cetaceans would not occur close to shore or in shallow water, especially in inland waters.

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, 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[13] and high-frequency cetaceans and pinnipeds). 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, <u>the Commission recommends</u> that the Navy (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 the shallow water nearshore environment for the relevant marine mammal functional hearing groups (i.e., mid- and high-frequency cetaceans and pinnipeds) 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 the Navy chooses not to adjust its mitigation zones, then it should estimate 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 on updated, more realistic swim speeds, which should be incorporated into its LOA application.

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 harbor porpoises and 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

[13] 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).

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) during use of explosive sources. The Commission recognizes that, depending on conditions, marine mammals may avoid areas of excessive sound or activity. 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 3.4-21). 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 re-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 and 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 and in the current DEIS, which states 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 2010a, 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 (i.e., PTS) and mortality takes for that species to Level B (i.e., TTS) or Level A harassment (i.e., injury) 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. The Navy further reinforced that fact in its 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. 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 the DEIS regarding the effectiveness of various mitigation measures does not necessarily comport with its determination of mitigation effectiveness scores. For example, the Navy indicated that the mitigation zone for torpedo testing exercises is 1.9 km. However, the Navy stated it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen at distances closer to 1.9 km near the perimeter of the mitigation zone. The Commission is unclear how the Navy would implement a shut down or delay for odontocetes that are not in a large group or for pinnipeds. Nevertheless, the Navy concluded that the measure is likely effective at reducing the risk of injury to marine mammals that may be observed from the smaller distances within the mitigation zone and assigned the highest effectiveness score of 1 for the mortality zone and 0.5 for the injury zone (Table 3.4-22). Those effectiveness scores again seem to be measures of effort rather than of true effectiveness.

In addition, the Navy appears to be inconsistent in its use of the terms "range to effects zone" and "mitigation zone," which are not the same (see Table 5.3-2 of the DEIS). 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 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 inland waters and Western Behm Canal. 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 5.3-2). 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 5.3-1). 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, the Navy noted that due to the various detection probabilities, levels of experience, and dependence on 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 believes that it also would be improper to use the proof-of-concept data to draw any conclusions on the effectiveness of Navy lookouts. Accordingly, applicable data simply do not exist at the current time to fulfill the Navy's post-analysis objective. Based on these concerns, the Commission recommends that the Navy (1) use the total numbers of model-estimated Level A harassment and mortality takes rather than reducing the estimated numbers of Level A harassment and mortality takes based on the Navy's proposed post-model analysis and (2) incorporate those take estimates into its LOA application.

Cumulative impacts

The Navy's analysis of cumulative impacts on marine mammals extends the evaluations of individual and multiple sound-producing activities under the various alternatives provided in Chapter 3. The Navy's analytical framework is commendable, but its description and use of the framework in the DEIS fall short in several important respects.

First, the DEIS did not include the detailed information needed to assess the reliability of the framework. Without that information, the framework is a conceptual model only and the reader does not have sufficient information to judge its practical utility and, therefore, the soundness of the Navy's decision-making based on that model.

Second, the DEIS indicated that the Navy omitted from its overall cumulative impact analysis stressors or activities found to have a negligible impact on an individual species. Doing so runs counter to the idea behind a cumulative impact assessment. CEQ's regulations for implementing the National Environmental Policy Act point out that "[c]Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). In essence, the approach used in the DEIS does not support a cumulative impacts analysis.

To address these fundamental concerns, the Commission recommends that the Navy revise its DEIS to (1) include in its cumulative impacts analysis all potential risk factors, including those that are deemed individually minor but could be significant when considered collectively and (2) provide sufficient details to allow the reader to evaluate the utility of the Navy's conceptual framework for its cumulative impacts analysis.

Possible errors in the take tables

The Commission observed some possible errors in the take tables provided in the Navy's DEIS, LOA application, and NWTT technical report that includes the raw modeled data (NWTT-TR; Department of the Navy 2014a). For example, in the NWTT-TR, the model-estimated takes for TTS exceed those for behavior for both *Kogia* spp. (52.67 and 13.83, respectively) and Dall's porpoises (2429.77 and 758.91, respectively) exposed to non-impulsive sources (acoustic sources) during training events under Alternative 1[14] (Table 14 in Department of the Navy 2014a), but not for harbor porpoises (768.59 and 5920.38, respectively). The Commission is unsure how the takes would be so much greater for the TTS threshold when it is higher than the 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[15] as the upper limit of BRF_2[16] (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)[17], 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 recommends that the Navy (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

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[14] Alternative 1 in the DEIS and NWTT-TR is the Preferred Alternative, as discussed in the LOA application.

[15] Based on the Commission's rationale in the criteria and thresholds section of this letter.

[16] 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.

[17] The environmental compliance documents under TAP are currently in place, including the final rules and associated letters of authorization under the MMPA that expire in 2015.

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 NWTT-TR down in its DEIS and LOA application rather than rounding to the nearest whole number, which the Commission believes was the Navy's policy for species listed under the Marine Mammal Protection Act (MMPA) in its environmental compliance documents for its TAP Program. When determining the population within a modeling area in its NWTT-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 Steller sea lions exposed to non-impulsive sources during training events under Alternative 1 in the NWTT-TR was 398.98 (Table 14 in Department of the Navy 2014a), but was rounded down to 398 in the DEIS (Table 3.4-17) and LOA application (Table 5.2[18]). It is unclear why the Navy wouldn't be rounding to the nearest whole number in its DEIS and LOA application. Accordingly, the Commission recommends that the Navy round its takes, based on those takes in the NWTT-TR tables, to the nearest whole number or zero in all of its take tables in the DEIS and LOA application.

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

Sincerely,

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Cc: Jolie Harrison, National Marine Fisheries Service

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[18] The Commission understands that Table 5-2 includes takes for exposure to both non-impulsive and impulsive sources, but the model-estimated takes for non-TTS (behavior) and TTS were 0 and 0.05 which would equal 0.

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