

DEPARTMENT OF COMMERCE**National Oceanic and Atmospheric Administration****50 CFR Part 218**

[Docket No. 141125997–7365–02]

RIN 0648–BE67

Takes of Marine Mammals Incidental to Specified Activities; U.S. Navy Training Activities in the Gulf of Alaska Temporary Maritime Activities Area

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: Upon application from the U.S. Navy (Navy), we (NMFS) are issuing regulations under the Marine Mammal Protection Act (MMPA) to govern the unintentional taking of marine mammals incidental to the training activities conducted in the Gulf of Alaska (GOA) Temporary Maritime Activities Area (TMAA) Study Area (hereafter referred to the Study Area) from May 2017 through May 2022. These regulations allow us to issue a Letter of Authorization (LOA) for the incidental take of marine mammals during the Navy's specified activities and timeframes, set forth the permissible methods of taking, set forth other means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat, and set forth requirements pertaining to the monitoring and reporting of the incidental take.

DATES: Effective April 26, 2017, through April 26, 2022.

ADDRESSES: To obtain an electronic copy of the Navy's LOA application or other referenced documents, visit the internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at 1315 East-West Highway, SSMC III, Silver Spring, MD 20912.

FOR FURTHER INFORMATION CONTACT: Jolie Harrison, Office of Protected Resources, NMFS, (301) 427–8477.

SUPPLEMENTARY INFORMATION:**Availability**

A copy of the Navy's LOA application may be obtained by visiting the internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>. The Navy's Final Supplemental Environmental Impact Statement/ Overseas Environmental Impact

Statement (FSEIS/OEIS) for the GOA TMAA Study Area, which also contains a list of the references used in this document, may be viewed at <http://www.goaeis.com>. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address (see **ADDRESSES**).

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the Secretary sets forth permissible methods of taking and other means of effecting the least practicable impact on the species or stock and its habitat. NMFS has defined "negligible impact" in 50 CFR 216.103 as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

The National Defense Authorization Act of 2004 (NDAA) (Pub. L. 108–136) removed the "small numbers" and "specified geographical region" limitations indicated above and amended the definition of "harassment" as applies to a "military readiness activity" to read as follows (section 3(18)(B) of the MMPA, 16 U.S.C. 1362(18)(B)): "(i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild" (Level A Harassment); or "(ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered" (Level B Harassment).

Summary of Request

On July 28, 2014, NMFS received an application from the Navy requesting an LOA for the take of 19 species of marine mammals, representing 27 stocks, incidental to Navy training activities to be conducted in the Study Area over 5 years. On October 14, 2014, the Navy submitted a revised LOA application to reflect minor changes in the number and types of training activities. To address minor inconsistencies with the draft SEIS/OEIS (DSEIS/OEIS), the Navy submitted a final revision to the LOA application (hereafter referred to as the LOA application) on January 21, 2015. In November 2016, the Navy requested that the final rule and LOA be issued for the training activities addressed by Alternative 1 of the FSEIS/OEIS. The Navy's LOA application was based on the training activities addressed by Alternative 2 of the DSEIS/OEIS; therefore, our proposed rule (81 FR 9950; February 26, 2016) analyzed the level of activities as described by Alternative 2. Pursuant to the Navy's November 2016 request, the final rule now reflects the training activities addressed by Alternative 1 of the FSEIS/OEIS, which include a subset of the activities analyzed in the proposed rule. The change from Alternative 2 to Alternative 1 results in a significant reduction in proposed training activities (see "Training" and "Summary of Impulsive and Non-Impulsive Sources"), lessening the number of the Carrier Strike Group Events from 2 to 1 per year, and the number of SINKEXs from 2 to 0 per year, which means that several types of explosives will no longer be used and there will be no live MISSILEX. This significantly decreases the number of anticipated and authorized takes for this activity (see "Take Request") compared to what was presented in the proposed rule.

The Navy is requesting a five-year LOA for training activities to be conducted from May 2017 through May 2022. The Study Area is a polygon roughly the shape of a 300 nm by 150 nm rectangle oriented northwest to southeast in the long direction, located south of Prince William Sound and east of Kodiak Island, Alaska (see Figure 1–1 of the LOA application for a map of the Study Area). The activities conducted within the Study Area are classified as military readiness activities. The Navy states that these activities may expose some of the marine mammals present within the Study Area to sound from underwater acoustic sources and explosives. The Navy's request for authorization is for the incidental take of individuals of 19

species of marine mammals, representing 27 stocks, by Level B harassment and one species of marine mammal (Dall's porpoise) by Level A harassment. The Navy is not requesting mortality takes for any species.

The LOA application, proposed rule (81 FR 9950; February 26, 2016), and GOA FSEIS/OEIS contain acoustic thresholds that, in some instances, represent changes from what NMFS has used to evaluate the Navy's activities for previous authorizations. These thresholds, which the Navy developed in coordination with NMFS, are based on the evaluation and inclusion of new information from recent scientific studies; a detailed explanation of how they were derived is provided in the GOA FSEIS/OEIS Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis Technical Report (available at <http://www.goaeis.com>).

On August 4, 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (new Guidance). This new Guidance established new thresholds and associated weighting functions for predicting auditory injury, or permanent threshold shift (PTS), which equates to Level A harassment under the MMPA, and temporary threshold shift (TTS), which is considered Level B harassment under the MMPA. In the August 4, 2016, **Federal Register** notice announcing the new Guidance (81 FR 51694), NMFS explained the approach it would take during a transition period, during which we will balance the need to consider this new best available science with the fact that some applicants have already committed time and resources to the development of analyses based on our previous thresholds and have constraints that preclude the recalculation of take estimates, as well as consideration of where the action is in the agency's decision-making "pipeline." In that notice, we included a non-exhaustive list of factors that would inform the most appropriate approach for considering the new Guidance, including: How far in the process the application or prospective application has progressed; when the activity is scheduled to begin or other timing constraints; the complexity of the analyses and the cost and practicality of redoing them; the temporal and spatial scope of anticipated effects; and the relative degree to which the new Guidance is expected to affect the results of the acoustic impact analyses.

In developing the new Guidance, NMFS compiled, interpreted, and synthesized scientific information

currently available on the effects of anthropogenic sound on marine mammals, including a recent Technical Report by Dr. James Finneran (U.S. Navy-SPAWAR Systems Center Pacific) that proposed new weighting functions and thresholds for predicting the onset of both PTS and temporary threshold shifts (TTS) in marine mammals (Finneran, 2016). The methodologies presented within this paper (and in NMFS' new Guidance) build upon the methodologies used to develop the criteria applied within the proposed rule and Navy's GOA FSEIS/OEIS (Finneran and Jenkins, 2012), and incorporate relevant auditory research made available since 2012 (*e.g.*, Kastelein *et al.*, 2012a; Kastelein *et al.*, 2012b; Finneran and Schlundt, 2013; Kastelein *et al.*, 2013a; Kastelein *et al.*, 2013b; Popov *et al.*, 2013; Kastelein *et al.*, 2014a; Kastelein *et al.*, 2014b; Popov *et al.*, 2014; Finneran *et al.*, 2015; Kastelein *et al.*, 2015a; Kastelein *et al.*, 2015b; Popov *et al.*, 2015). In light of limited data at the time, Finneran and Jenkins (2012) presented a conservative approach to development of auditory weighting functions. In 2016, with the benefit of newly-available data, Finneran was able to synthesize a wide range of auditory data, including newly-available studies, to predict refined auditory weighting functions and corresponding TTS and PTS thresholds across the complete hearing ranges of functional hearing groups. At the time of the release of the proposed rule and GOA FSEIS/OEIS, NMFS' new Guidance had not been issued. Further, the new criteria were not available for the Navy's acoustic effects modeling used to calculate distances to harassment thresholds and resulting take estimates. Therefore, the Navy did not directly use the new auditory weighting functions and PTS/TTS criteria in its GOA FSEIS/OEIS.

In addition to the fact that it was possible to address the new Guidance adequately without remodeling it would have been impractical for the Navy to entirely re-model its proposed action based on the new Guidance. The Navy committed substantial time and resources to the development of acoustic analyses based on previous acoustic thresholds. Data and information (*e.g.*, on marine species density) gathering for this second GOA rule (Phase II, 2017–2022) modeling began in November 2011 and subsequent modeling occurred over a 20-month period from October 2012 to June 2014. The contract costs for modeling GOA events were significant, as was Navy Pacific Fleet staff labor.

The underlying science contained within Finneran (2016) (upon which NMFS' new Guidance is based) has been addressed qualitatively within the applicable sections of the GOA FSEIS/OEIS and this final rulemaking. Further, although the writers of the base code for the model used for Phase II were not available to recode the model with the updated impulsive criteria in terms of weighting functions, the Navy was able to use the model to reprocess anticipated explosive ranges to effects for PTS based on the criteria presented in the new Guidance to assess if the new criteria could result in any additional species-specific injury exposures. In short, the Navy quantitatively reanalyzed PTS ranges and exposures from explosive sources using the new Guidance, from which TTS and behavioral exposures could be estimated, but the sonar exposures were not remodeled because a qualitative assessment of the new Guidance and the activities showed that it was not necessary in order to support the analysis, in addition to being impractical.

For the sonar exposure estimates, if the new Guidance was quantitatively applied to the GOA TMAA effects analysis and new modeling conducted, predicted numbers of PTS and/or TTS would change to some small degree (even if only by fractions of a take). However, because the new Guidance relies on much of the same data as the auditory criteria presented in the proposed rule and the Navy's GOA FSEIS/OEIS, these changes would not be substantial (as described in more detail below), and in most cases would result in a reduction in the predicted impacts.

Onset PTS thresholds for non-impulsive sound (sonar) are largely lower (*i.e.*, are more conservative) in Finneran and Jenkins 2012 (used in GOA FSEIS/OEIS) compared to the new Guidance, while updated auditory weighting functions for most marine mammal hearing groups have changed minimally in the new Guidance. This means that the predicted ranges to PTS and TTS in the GOA FSEIS/OEIS and this final rule for non-impulsive sources would change only minimally (and for the most part are larger than what would result) if NMFS' new Guidance were quantitatively applied and new modeling conducted (*i.e.*, estimated numbers of takes resulting in PTS and TTS from sonar are, for the most part, larger in this final rule than would be expected if the Navy's activities were remodeled using the new Guidance). Specifically, PTS thresholds for non-impulsive sources for all taxa went up

(*i.e.*, are less conservative), except for Otariids, for which they went down by one dB. Given that the PTS range to effects for Otariids was previously 10m, a 1 dB change in the PTS threshold would not change the PTS range to effects by more than a couple of meters for any acoustic source. For TTS, the onset thresholds for cetaceans in the new Guidance all went up (*i.e.*, are less conservative) or stayed the same (*i.e.*, ranges to effects and take estimates for TTS would go down or stay the same for cetaceans if the Navy's activities were re-modeled using the new Guidance). The onset thresholds for TTS for Phocids and Otariids went down by 2 dB and 7 dB, respectively. The previous range to effects was 70–1720m for Phocids and 230–570m for Otariids for the largest source (53C). If spherical spreading were conservatively considered, applying the new Guidance, the range to TTS for Phocids would likely be no more than approximately 100–2,200m and the range for Otariids would likely be no more than approximately 500–1,300m. The originally modeled TTS for pinnipeds was zero for all but one species. When the lower likelihood of overlap of most pinniped species (those with 0 TTS estimates) with these activities is considered in combination with their densities and the change in the size of the ensonified zone, our analysis still suggests that TTS take is not likely to occur, and those Level B take estimates have not been changed. Further, any small changes to predicted TTS takes for Northern elephant seals that might result from applying the new guidance, and specifically considering the slightly larger ensonified volume resulting from the 2 dB decrease in the threshold, would be expected to be in the form of changing a modeled behavioral harassment to a TTS, resulting in no net change in the Level B harassment take estimates.

For impulsive sound (explosives), the Navy was able to reprocess anticipated ranges to effects for Level A harassment (PTS), and subsequently ranges to effects for TTS and behavioral exposures, based on the new Guidance to assess if the new impulsive criteria could result in any additional species-specific takes. The conclusion from that analysis was that the new impulsive criteria would not change previous species-specific quantities of impulsive PTS, TTS, or behavioral exposures for any species except Dall's porpoise, and the mitigation zones described in the proposed rule (as shown in *Mitigation Zones*) for each type of explosives training activity remain sufficiently

protective (*i.e.*, mitigation zones encompass newly calculated PTS zones for all explosive types and hearing groups). Consideration of the new Guidance results in an increase in take for Dall's porpoise by 3 Level A and 149 Level B harassment takes (12 TTS and 137 behavioral reactions) above what is described in Alternative 1 of the FEIS/OEIS. These updated take numbers are included in the "Take Request" section.

In summary, NMFS' consideration of the new Guidance does not substantially alter our assessment of the likely responses of marine mammals to acoustic sources employed by the Navy in the GOA TMAA Study Area (though take numbers have been altered slightly where appropriate as described above and in the Estimated Take section), or the likely fitness consequences of those responses. Overall, predicted auditory effects within this rulemaking would not change significantly. As described, application of the new Guidance represents only minor changes in take estimates, and would not change NMFS' final analysis and negligible impact determination. Further, the robust monitoring and mitigation measures in this final rule satisfy the "least practicable adverse impact" standard.

Of additional note, the definition of an "Unusual Mortality Event," which is necessary to the implementation of the Navy's Stranding Response Plan, has been added to the final regulations. This addition corrects an oversight in the proposed rule and does not represent a significant change.

Background of Request

The Navy's mission is to organize, train, equip, and maintain combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. Consistent with this mission, 10 U.S.C. 5062 mandates that naval forces be trained and equipped for prompt and sustained combat incident to operations at sea, and that naval forces be prepared for the effective prosecution of war.¹ The Navy executes this responsibility by establishing and executing training programs, including at-sea training and exercises, and ensuring naval forces have access to the ranges, operating areas (OPAREAs), and airspace needed to develop and maintain skills for conducting military readiness activities.

The Navy proposes to continue conducting training activities within the Study Area, which have been ongoing since the 1990s. The tempo and types of training activities have evolved and fluctuated to some degree because of the

introduction of new technologies, the dynamic nature of international events, advances in war fighting doctrine and procedures, and force structure (organization of ships, submarines, aircraft, weapons, and personnel) changes. Such developments influence the frequency, duration, intensity, and location of required training activities, but the essential character and basic level of the military readiness activities conducted in the Study Area has remained largely unchanged. The Navy's LOA request covers training activities that would occur over a five-year period beginning in May 2017. NMFS' previous MMPA incidental take authorization for the GOA TMAA expired in May 2016.

Description of the Specified Activity

The proposed rule (81 FR 9950; February 26, 2016) and GOA FSEIS/OEIS include a complete description of the Navy's specified training activities incidental to which NMFS is authorizing take of marine mammals in this final rule. Sonar use and underwater detonations are the stressors most likely to result in impacts on marine mammals that could rise to the level of harassment. Detailed descriptions of these activities are provided in the FSEIS/OEIS and in the LOA application (<http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>) and are summarized here.

Overview of Training Activities

The Navy routinely trains in the Study Area in preparation for national defense missions. Training activities and exercises covered in the Navy's LOA request are briefly described below, and in more detail within chapter 2 of the GOA FSEIS/OEIS. Each military training activity described meets a requirement that can be traced ultimately to requirements set forth by the National Command Authority.²

The Navy categorizes training activities into eight functional warfare areas called primary mission areas: Anti-air warfare; amphibious warfare; strike warfare; Anti-surface warfare (ASUW); anti-submarine warfare (ASW); electronic warfare; mine warfare (MIW); and naval special warfare (NSW). Most training activities are categorized under one of these primary mission areas; those activities that do not fall within one of these areas are in a separate

¹Title 10, Section 5062 of the U.S.C.

²"National Command Authority" is a term used by the United States military and government to refer to the ultimate lawful source of military orders. The term refers collectively to the President of the United States (as commander-in-chief) and the United States Secretary of Defense.

“other” category. Each warfare community (surface, subsurface, aviation, and special warfare) may train within some or all of these primary mission areas. However, not all primary mission areas are conducted within the Study Area.

The Navy described and analyzed the effects of its training activities within the GOA FSEIS/OEIS. In its assessment, the Navy concluded that of the activities conducted within the Study Area, sonar use and underwater detonations were the stressors resulting in impacts on marine mammals that could rise to the level of harassment as defined under the MMPA. Therefore, the LOA application provides the Navy’s assessment of potential effects from these stressors. The specific acoustic sources used in the LOA application are contained in the GOA FSEIS/OEIS and are presented in the following sections based on the primary mission areas.

Anti-Surface Warfare (ASUW)

The mission of ASUW is to defend against enemy ships or boats. In the conduct of ASUW, aircraft use cannons, air-launched cruise missiles or other precision-guided munitions; ships employ torpedoes, naval guns, and surface-to-surface (S-S) missiles; and submarines attack surface ships using torpedoes or submarine-launched, anti-ship cruise missiles.

Anti-surface warfare training in the Study Area includes S-S gunnery and missile exercises (GUNEX and MISSILEX) and air-to-surface (A-S) bombing exercises (BOMBEX), GUNEX, and MISSILEX. Of note, the MISSILEX in GOA does not expend ordnance.

Anti-Submarine Warfare (ASW)

The mission of ASW is to locate, neutralize, and defeat hostile submarine threats to surface forces. ASW is based on the principle of a layered defense of surveillance and attack aircraft, ships, and submarines all searching for hostile submarines. These forces operate together or independently to gain early warning and detection, and to localize, track, target, and attack hostile submarine threats.

Anti-submarine warfare training addresses basic skills such as detection and classification of submarines, distinguishing between sounds made by enemy submarines and those of friendly submarines, ships, and marine life. ASW training evaluates the ability of fleet assets to use systems, for example, active and passive sonar and torpedo systems to counter hostile submarine threats. More advanced, integrated ASW training exercises are conducted in coordinated, at-sea training events

involving submarines, ships, and aircraft. This training integrates the full spectrum of ASW from detecting and tracking a submarine to attacking a target using simulated weapons.

Description of Sonar, Ordnance, Targets, and Other Systems

The Navy uses a variety of sensors, platforms, weapons, and other devices to meet its mission. Training with these systems and devices may introduce acoustic (sound) energy into the environment. The Navy’s current LOA application describes underwater sound as one of two types: Impulsive and non-impulsive. Sonar and similar sound producing systems are categorized as non-impulsive sound sources. Underwater detonations of explosives and other percussive events are impulsive sounds.

Sonar and Other Active Acoustic Sources

Modern sonar technology includes a variety of sonar sensor and processing systems. In concept, the simplest active sonar emits sound waves, or “pings,” sent out in multiple directions, and the sound waves then reflect off of the target object in multiple directions. The sonar source calculates the time it takes for the reflected sound waves to return; this calculation determines the distance to the target object. More sophisticated active sonar systems emit a ping and then rapidly scan or listen to the sound waves in a specific area. This provides both distance to the target and directional information. Even more advanced sonar systems use multiple receivers to listen to echoes from several directions simultaneously and provide efficient detection of both direction and distance. Active sonar is rarely used continuously throughout the listed activities. In general, when sonar is in use, the sonar “pings” occur at intervals, referred to as a duty cycle, and the signals themselves are very short in duration. For example, sonar that emits a 1-second ping every 10 seconds has a 10 percent duty cycle. The Navy’s largest hull-mounted mid-frequency sonar source typically emits a 1-second ping every 50 seconds representing a 2 percent duty cycle. The Navy utilizes sonar systems and other acoustic sensors in support of a variety of mission requirements. Primary uses include the detection of and defense against submarines (ASW) and mines (MIW); safe navigation and effective communications; use of unmanned undersea vehicles; and oceanographic surveys. Sources of sonar and other active acoustic sources include surface

ship sonar, sonobuoys, torpedoes, and unmanned underwater vehicles.

Ordnance and Munitions

Most ordnance and munitions used during training events fall into three basic categories: Projectiles (such as gun rounds), missiles (including rockets), and bombs. Ordnance can be further defined by their net explosive weight (NEW), which considers the type and quantity of the explosive substance without the packaging, casings, bullets, etc. NEW is the trinitrotoluene (TNT) equivalent of energetic material, which is the standard measure of strength of bombs and other explosives. For example, a 5-inch shell fired from a Navy gun is analyzed at approximately 9.5 pounds (lb.) (4.3 kilograms (kg)) of NEW. The Navy also uses non-explosive ordnance in place of explosive ordnance in many training and testing events. Non-explosive ordnance look and perform similarly to explosive ordnance, but lack the main explosive charge.

Defense Countermeasures

Naval forces depend on effective defensive countermeasures to protect themselves against missile and torpedo attack. Defensive countermeasures are devices designed to confuse, distract, and confound precision-guided munitions. Defensive countermeasures analyzed in this LOA application include acoustic countermeasures, which are used by surface ships and submarines to defend against torpedo attack. Acoustic countermeasures are either released from ships and submarines, or towed at a distance behind the ship.

Classification of Non-Impulsive and Impulsive Sources Analyzed

In order to better organize and facilitate the analysis of approximately 300 individual sources of underwater acoustic sound or explosive energy, a series of source classifications, or source bins, were developed by the Navy. The use of source classification bins provides the following benefits:

- Provides the ability for new sensors or munitions to be covered under existing regulatory authorizations, as long as those sources fall within the parameters of a “bin”;
- Simplifies the source utilization data collection and reporting requirements anticipated under the MMPA;
- Ensures a conservative approach to all impact analysis, as all sources in a single bin are modeled as the loudest source (*e.g.*, lowest frequency, highest source level (the term “source level” refers to the loudness of a sound at its source), longest duty cycle, or largest NEW) within that bin, which:

- Allows analysis to be conducted more efficiently, without compromising the results; and
- Provides a framework to support the reallocation of source usage (hours/explosives) between different source bins, as long as the total number and severity of marine mammal takes remain within the overall analyzed and authorized limits. This flexibility is required to support evolving Navy training requirements, which are linked to real world events.

There are two primary types of acoustic sources: Impulsive and non-impulsive. A description of each source classification is provided in Tables 1 and 2. Impulsive source class bins are based on the NEW of the munitions or explosive devices or the source level for air and water guns. Non-impulsive acoustic sources are grouped into source class bins based on the frequency,³ source level,⁴ and, when warranted, the application in which the source would be used. The following factors further describe the considerations associated with the development of non-impulsive source bins.

- Frequency of the non-impulsive source:
 - Low-frequency sources operate below 1 kilohertz (kHz);
 - Mid-frequency sources operate at and above 1 kHz, up to and including 10 kHz;

- High-frequency sources operate above 10 kHz, up to and including 100 kHz;
- Very high-frequency sources operate above 100 kHz but below 200 kHz.
 - Source level of the non-impulsive source;
 - Greater than 160 decibels (dB), but less than 180 dB;
 - Equal to 180 dB and up to 200 dB;
 - Greater than 200 dB.
 - Application in which the source would be used;
 - How a sensor is employed supports how the sensor's acoustic emissions are analyzed;
 - Factors considered include pulse length (time source is on); beam pattern (whether sound is emitted as a narrow, focused beam or, as with most explosives, in all directions); and duty cycle (how often or how many times a transmission occurs in a given time period during an event).

As described in the GOA FSEIS/OEIS, non-impulsive acoustic sources that have low source levels (not loud), narrow beam widths, downward directed transmission, short pulse lengths, frequencies beyond known hearing ranges of marine mammals, or some combination of these characteristics, are not anticipated to result in takes of protected species and therefore were not modeled. These sources generally meet one of the following criteria, are considered *de*

mimimis sources, and are qualitatively analyzed in the GOA FSEIS/OEIS:

- Acoustic sources with frequencies greater than 200 kHz (based on known marine mammal hearing ranges); and
- Sources with source levels less than 160 dB.

Source Classes Analyzed for Training

Table 1 shows the impulsive sources (e.g., underwater explosives) associated with training activities analyzed in the Study Area, as proposed in the Navy's LOA request and described in the proposed rule. Alternative 1 of the FSEIS/OEIS, the specific activity for which the incidental taking of marine mammals is authorized pursuant to this final rule, includes zero detonations from the E6, E7, E8, and E11 source bins, as indicated in Table 1. Table 2 shows non-impulsive sources (e.g., sonar) associated with training activities analyzed in the Study Area, as proposed in the Navy's LOA request and described in the proposed rule. Alternative 1 of the FSEIS/OEIS includes zero torpedoes from the TORP2 category, as indicated in Table 2. Additionally, Alternative 1 does not include live MISSILEX exercises, which were included in the proposed rule.

TABLE 1—IMPULSIVE (EXPLOSIVE) TRAINING SOURCE CLASSES ANALYZED QUANTITATIVELY

Source class	Representative munitions	Net explosive weight (lbs.)
E5	5-inch projectiles	>5–10
E6*	AGM–114 Hellfire missile	>10–20
E7*	AGM–88 High-speed Anti-Radiation Missile	>20–60
E8*	250 lb. bomb	>60–100
E9	500 lb. bomb	>100–250
E10	1,000 lb. bomb	>250–500
E11*	MK–48 torpedo	>500–650
E12	2,000 lb. bomb	>650–1,000

* **Note**—these bins are not covered by this final rule, since Navy reduced their proposed activity in their incidental take request.

TABLE 2—NON-IMPULSIVE TRAINING SOURCE CLASSES ANALYZED QUANTITATIVELY

Source class category	Source class	Description of representative sources
Mid-Frequency (MF): Tactical and non-tactical sources that produce mid-frequency (1–10 kHz) signals.	MF1	Hull-mounted surface ship sonar (e.g., AN/SQS–53C and AN/SQS–60).
	MF3	Hull-mounted submarine sonar (e.g., AN/BQQ–10).
	MF4	Helicopter-deployed dipping sonar (e.g., AN/AQS–22 and AN/AQS–13).
	MF5	Active acoustic sonobuoys (e.g., DICASS).
	MF6	Active underwater sound signal devices (e.g., MK–84).
	MF11	Hull-mounted surface ship sonar with an active duty cycle greater than 80%.
High-Frequency (HF): Tactical and non-tactical sources that produce high-frequency (greater than 10 kHz but less than 100 kHz) signals.	HF1	Hull-mounted submarine sonar (e.g., AN/BQQ–10).
	HF6	Active sources (equal to 180 dB and up to 200 dB).

³ Bins are based on the typical center frequency of the source. Although harmonics may be present,

those harmonics would be several decibels (dB) lower than the primary frequency.

⁴ Source decibel levels are expressed in terms of sound pressure level (SPL) and are values given in dB referenced to 1 micropascal at 1 meter.

TABLE 2—NON-IMPULSIVE TRAINING SOURCE CLASSES ANALYZED QUANTITATIVELY—Continued

Source class category	Source class	Description of representative sources
Anti-Submarine Warfare (ASW): Tactical sources such as active sonobuoys and acoustic countermeasures systems used during the conduct of ASW training activities.	ASW2	Mid-frequency Multistatic Active Coherent sonobuoy (e.g., AN/SSQ-125).
	ASW3	Mid-frequency towed active acoustic countermeasure systems (e.g., AN/SLQ-25).
	ASW4	Mid-frequency expendable active acoustic device countermeasures (e.g., MK-3).
*Torpedoes (TORP): Source classes associated with the active acoustic signals produced by torpedoes.	TORP2	Heavyweight torpedo (e.g., MK-48, electric vehicles).

Notes: dB = decibels, DICASS = Directional Command Activated Sonobuoy System, kHz = kilohertz.
 *TORP not covered by this rule since Navy reduced their activities.

Training

The training activities with potential impacts to marine mammals that the Navy proposes to conduct in the Study Area are described in Table 3. The table is organized according to primary

mission areas and includes the activity name, associated stressor(s), description of the activity, the primary platform used (e.g., ship or aircraft type), duration of activity, type of non-impulsive or impulsive sources used in

the activity, and the number of activities per year. More detailed activity descriptions can be found in chapter 2 of the GOA FSEIS/OEIS. The Navy's activities are anticipated to meet training needs in the years 2017–2022.

TABLE 3—TRAINING ACTIVITIES WITHIN THE STUDY AREA. ACTIVITIES NOW REFLECT NAVY'S ALTERNATIVE 1, WHICH NO LONGER INCLUDES SINKING EXERCISES AND INCLUDES ONE, INSTEAD OF TWO, CSG EXERCISES

Category	Training activity	Description	Weapons/rounds/sound source
Anti-Surface Warfare (ASUW)			
Impulsive	Gunnery Exercise, Surface-to-Surface (Ship) (GUNEX-S-S (Ship)).	Ship crews engage surface targets with ship's small-, medium-, and large-caliber guns.	Small-, Medium-, and Large-caliber high explosive rounds.
Impulsive	Bombing Exercise (Air-to-Surface) (BOMBEX (A-S)).	Fixed-wing aircrews deliver bombs against surface targets.	High explosive bombs.
Anti-Submarine Warfare (ASW)			
Non-impulsive	Tracking Exercise—Submarine (TRACKEX—Sub).	Submarine searches for, detects, and tracks submarine(s) and surface ship(s).	Mid- and high-frequency submarine sonar.
Non-impulsive	Tracking Exercise—Surface (TRACKEX—Surface).	Surface ship searches for, tracks, and detects submarine(s).	Mid-frequency surface ship sonar, acoustic countermeasures, and high-frequency active sources.
Non-impulsive	Tracking Exercise—Helicopter (TRACKEX—Helo).	Helicopter searches, tracks, and detects submarine(s).	Mid-frequency dipping sonar systems and sonobuoys.
Non-impulsive	Tracking Exercise—Maritime Patrol Aircraft (TRACKEX—MPA).	Maritime patrol aircraft use sonobuoys to search for, detect, and track submarine(s).	Sonobuoys, such as DICASS sonobuoys.
Non-impulsive	Tracking Exercise—Maritime Patrol Aircraft (MAC Sonobuoys).	Maritime patrol aircraft crews search for, detect and track submarines using MAC sonobuoys.	mid-frequency MAC sonobuoys.

Notes: DICASS = Directional Command Activated Sonobuoy System; MAC=Multistatic Active Coherent.

Summary of Impulsive and Non-Impulsive Sources

Table 4 provides a quantitative annual summary of training activities by sonar

and other active acoustic source class analyzed in the Navy's LOA request. Annual use has been updated since publication of the notice for the

proposed rule and now reflects Navy's Alternative 1, which results in a reduction of annual use by about half.

TABLE 4—ANNUAL HOURS AND UNITS OF SONAR AND OTHER ACTIVE ACOUSTIC SOURCES USED DURING TRAINING WITHIN THE STUDY AREA

Source class category	Source class	Units	Annual use
Mid-Frequency (MF)	MF1	Hours	271
Active sources from 1 to 10 kHz	MF3	Hours	24
	MF4	Hours	26

TABLE 4—ANNUAL HOURS AND UNITS OF SONAR AND OTHER ACTIVE ACOUSTIC SOURCES USED DURING TRAINING WITHIN THE STUDY AREA—Continued

Source class category	Source class	Units	Annual use
High-Frequency (HF): Tactical and non-tactical sources that produce signals greater than 10 kHz but less than 100 kHz.	MF5 *	Items	126
	MF6	Items	11
	MF11	Items	39
	HF1	Hours	12
	HF6	Hours	40
	ASW2	Hours	40
Anti-Submarine Warfare (ASW)	ASW3	Hours	273
Active ASW sources	ASW4 *	Items	6
Torpedoes (TORP) Source classes associated with active acoustic signals produced by torpedoes	TORP2	Items	0

* Annual use for MF5 and ASW4 was incorrectly identified in the proposed rule as 25 and 4, respectively. Annual use for these source classes is 252 and 12, respectively, for Alternative 2—but is half that here, reflecting Alternative 1.

Table 5 provides a quantitative annual summary of training explosive source classes analyzed in the Navy’s LOA request. Annual number of in-water detonations has been updated since publication of the notice for the proposed rule and now reflects Navy’s Alternative 1, which results in a reduction of detonations by at least half.

TABLE 5—ANNUAL NUMBER OF TRAINING EXPLOSIVE SOURCE DETONATIONS USED DURING TRAINING WITHIN THE STUDY AREA

Explosive class net explosive weight (pounds (lb.))	Annual in-water detonations training
E5 (≤5–10 lb.)	56
E6 (≤10–20 lb.)	0
E7 (≤20–60 lb.)	0
E8 (≤60–100 lb.)	0
E9 (≤100–250 lb.)	64
E10 (≤250–500 lb.)	6
E11 (≤500–650 lb.)	0
E12 (≤650–1,000 lb.)	2

Duration and Location

Training activities would be conducted in the Study Area during one exercise of up to 21 days per year between the months of April and October to support a major joint training exercise in Alaska and off the Alaskan coast that involves the Departments of the Navy, the Army, Air Force, and the U.S. Coast Guard (Coast Guard). The Service participants report to a unified or joint commander who coordinates the activities planned to demonstrate and evaluate the ability of the services to engage in a conflict and carry out plans in response to a threat to national security. Take incidental to the annual exercise would be authorized between May 2017 and May 2022.

The Study Area (see Figure 1–1 of the LOA application) is entirely at sea and is composed of the established GOA

TMAA and a warning area in the Gulf of Alaska. The Navy uses “at-sea” to include its training activities in the Study Area that occur (1) on the ocean surface, (2) beneath the ocean surface, and (3) in the air above the ocean surface. Navy training activities occurring on or over the land outside the GOA TMAA are covered under previously prepared environmental documentation prepared by the U.S. Air Force and the U.S. Army. Gulf of Alaska Temporary Maritime Activities Area (GOA TMAA)

The GOA TMAA is a temporary area established in conjunction with the Federal Aviation Administration (FAA) for one exercise period of up to 21 days, that is a surface, undersea space, and airspace maneuver area within the Gulf of Alaska for ships, submarines, and aircraft to conduct required training activities. The GOA TMAA is a polygon roughly resembling a rectangle oriented from northwest to southeast, approximately 300 nautical miles (nm) in length by 150 nm in width, located south of Prince William Sound and east of Kodiak Island.

Airspace of the GOA TMAA

The airspace of the GOA TMAA overlies the surface and subsurface training area and is called an Altitude Reservation (ALTRV). This ALTRV is a temporary airspace designation, typically requested by the Alaskan Command (ALCOM) and coordinated through the FAA for the duration of the exercise. This overwater airspace supports the majority of aircraft training activities conducted by Navy and Joint aircraft throughout the joint training exercise. The ALTRV over the GOA TMAA typically extends from the ocean surface to 60,000 feet (ft) (18,288 meters (m)) above mean sea level and encompasses 42,146 square nautical miles (nm²) of airspace. For safety considerations, ALTRV information is sent via Notice to Airmen (NOTAM)/

International NOTAM so that all pilots are aware of the area and that Air Traffic Control will keep known Instrument Flight Rules aircraft clear of the area.

Additionally, the GOA TMAA overlies a majority of Warning Area W–612 (W–612) located over Blying Sound, towards the northwestern quadrant of the GOA TMAA. When not included as part of the GOA TMAA, W–612 provides 2,256 nm² of special use airspace for the Air Force and Coast Guard to fulfill some of their training requirements. Air Force, Army, National Guard, and Coast Guard activities conducted as part of at-sea joint training within the GOA TMAA are included in the FSEIS/OEIS analysis. No Navy training activities analyzed in this final rule occur in the area of W–612 that is outside of the GOA TMAA (see Figure 1–1 of the LOA application).

Sea and Undersea Space of the GOA TMAA

The GOA TMAA surface and subsurface areas are also depicted in Figure 1–1 of the LOA application. Total surface area of the GOA TMAA is 42,146 nm². Due to weather conditions, annual joint training activities are typically conducted during the summer months (April–October). The GOA TMAA undersea area lies beneath the surface area as depicted in Figure 1–1 of the LOA application. The undersea area extends to the seafloor.

The complex bathymetric and oceanographic conditions, including a continental shelf, submarine canyons, numerous seamounts, and fresh water infusions from multiple sources, create a challenging environment in which to search for and detect submarines in ASW training activities. In the summer, the GOA TMAA provides a safe cold-water training environment that resembles other areas where Navy may need to operate in a real-world scenario.

The GOA TMAA meets large-scale joint exercise training objectives to

support naval and joint operational readiness by providing a “geographically realistic” training area for U.S. Pacific Command, Joint Task Force Commander scenario-based training, and supports the mission requirement of Alaskan Command (ALCOM) to conduct joint training for Alaska-based forces. The strategic vision of the Commander, U.S. Pacific Fleet is that the training area supports naval operational readiness by providing a realistic, live-training environment for forces assigned to the Pacific Fleet and other users with the capability and capacity to support current, emerging, and future training requirements.

Description of Marine Mammals in the Area of the Specified Activities

Twenty-two marine mammal species have confirmed or possible occurrence within or adjacent to the Study Area, including seven species of baleen whales (mysticetes), eight species of toothed whales (odontocetes), six species of seals (pinnipeds), and the sea otter (mustelid). Three of these species (gray whale, sea otter, and ribbon seal) are not expected to be taken by the training activities, as discussed in Chapter 4 of the LOA application. Nine of these species are listed under the ESA: Blue whale, fin whale, humpback whale (Distinct Population Segment (DPS) and Western North Pacific DPS), sei whale, sperm whale, gray whale (Western North Pacific stock), North Pacific right whale, Steller sea lion (Western U.S. stock), and sea otter. The “Description of Marine Mammals in the Area of the Specified Activities” section was included in the proposed rule (81 FR 9950, 9956–57; February 26, 2016). These descriptions have not changed, with the exception of the humpback whale. On September 8, 2016, NMFS revised the ESA listing for humpback whales to identify 14 DPSs, listing one as threatened, four as endangered, and identifying nine others as not warranted for listing (81 FR 40870). Humpback whales from the threatened Mexico DPS, endangered Western North Pacific DPS, and Hawaii DPS, which was identified as not warranted for listing, could all occur in the Study Area.

Table 6 of the proposed rule provided a list of marine mammals with possible or confirmed occurrence within the GOA TMAA Study Area, including stock, abundance, and status. Information on the status, distribution, abundance, and vocalizations of marine mammal species in the Study Area may also be viewed in Chapter 4 of the LOA application (<http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>). Additional information on the general

biology and ecology of marine mammals is included in the GOA FSEIS/OEIS. In addition, NMFS annually publishes Stock Assessment Reports (SARs) for all marine mammals in U.S. EEZ waters, including stocks that occur within the Study Area (U.S. Pacific Marine Mammal Stock Assessments, Carretta *et al.*, 2015; Alaska Marine Mammal Stock Assessments, Muto and Angliss, 2015).

Potential Effects of Specified Activities on Marine Mammals

In the “Potential Effects of Specified Activities on Marine Mammals” section of the proposed rule (81 FR 9950; 9961–78; February 26, 2016), we included a qualitative discussion of the different ways that Navy training activities may potentially affect marine mammals without consideration of mitigation and monitoring measures. With the exception of the new information related to thresholds for auditory injury described earlier in this document, that information has not changed in a manner that would affect our analysis or findings and is not repeated here.

Mitigation

Under section 101(a)(5)(A) of the MMPA, NMFS must set forth the “permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for subsistence uses” (“least practicable adverse impact”). NMFS does not have a regulatory definition for least practicable adverse impact. The NDA for FY 2004 amended the MMPA as it relates to military readiness activities and the incidental take authorization process such that “least practicable adverse impact” shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the “military readiness activity.”

As discussed in the proposed rule, in *Conservation Council for Hawaii v. National Marine Fisheries Service*, 97 F. Supp.3d 1210, 1229 (D. Haw. Mar. 31, 2015), the court stated that NMFS “appear[s] to think [it] satisf[ies] the statutory ‘least practicable adverse impact’ requirement with a ‘negligible impact’ finding.” Following publication of the proposed rule, the Ninth Circuit Court of Appeals in *Natural Resources Defense Council v. Pritzker*, 828 F.3d 1125, 1134 (9th Cir. July 15, 2016), expressing similar concerns in a challenge to our last SURTASS LFA sonar incidental take rule, stated,

“Compliance with the ‘negligible impact’ requirement does not mean there [is] compliance with the ‘least practicable adverse impact standard [. . .] .” As the Ninth Circuit noted in its opinion, however, the court was interpreting the statute without the benefit of NMFS’ formal interpretation. We state here explicitly, as we have said in the past, that NMFS is in full agreement that the “negligible impact” and “least practicable adverse impact” requirements are distinct, even though both statutory standards refer to species and stocks. With that in mind, we provide further explanation of our interpretation of least practicable adverse impact, and explain what distinguishes it from the negligible impact standard. This discussion is consistent with, and expands upon, previous rules we have issued and the explanation provided in the proposed rule.

Before NMFS can issue incidental take regulations under section 101(a)(5)(A) of the MMPA, it must make a finding that the total taking will have a “negligible impact” on the affected “species or stocks” of marine mammals. NMFS’ and U.S. Fish and Wildlife Service’s joint implementing regulations for section 101(a)(5)(A) define “negligible impact” as “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.” 50 CFR 216.103 and 50 CFR 18.27(c). Recruitment (*i.e.*, reproduction) and survival rates are used to determine population growth rates⁵ and, therefore are considered in evaluating population level impacts.

As we stated in the preamble to the final rule for the joint implementing regulations, not every population-level impact violates the negligible impact requirement. The negligible impact standard does not require a finding that the anticipated take will have “no effect” on population numbers or growth rates: “The statutory standard does not require that the same recovery rate be maintained, rather that no significant effect on annual rates of recruitment or survival occurs [. . .]. [T]he key factor is the significance of the level of impact on rates of recruitment or survival.” See 54 FR 40338, 40341–42 (September 29, 1989).

While some level of impact on population numbers or growth rates of a species or stock may occur and still satisfy the negligible impact requirement—even without

⁵ A growth rate can be positive, negative, or flat.

consideration of mitigation—the least practicable adverse impact provision separately requires NMFS to prescribe the means of “effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance [. . .].”⁶⁷

The negligible impact and least practicable adverse impact standards in the statute share a common reference to “species or stocks.” A “species” is defined as a group of animals or plants that are similar and can produce young animals or plants: a group of related animals or plants that is smaller than a genus (<http://www.merriam-webster.com/dictionary/species>). “Population stock” or “stock” means “a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature.” 16 U.S.C. 1362(11). We believe those terms indisputably refer to populations of animals, and that it is therefore appropriate to view both MMPA provisions as having a population-level focus. This is consistent with both the language of the statute and Congress’ overarching conservation objective in enacting the MMPA. See 16 U.S.C. 1361 (Congress’ findings reflecting policy concerns about the extinction or depletion of certain marine mammal species or stocks and the goal of ensuring they are functioning elements of their ecosystems).

Recognizing this common focus of the two provisions on “species or stock” does not mean we conflate the standards; despite some common statutory language, we recognize the two provisions are different in other ways and have different functions.⁸ First, a negligible impact finding is required before NMFS can issue an incidental take authorization. Although it is acceptable to use mitigation to reach a negligible impact finding, 50 CFR 216.104(c), no amount of mitigation can enable NMFS to issue an incidental take authorization for an activity that still

⁶⁷For purposes of this discussion we omit reference to the language in the standard for least practicable adverse impact that says we also must mitigate for subsistence impacts because they are not at issue in this action.

⁸NMFS’ incidental take actions routinely refer to the least practicable adverse impact requirement in shorthand as “mitigation,” a concept that broadly encompasses measures or practices that are reasonably designed to avoid, reduce, or minimize impacts.

⁹See also *CBD v. Salazar*, 695 F.3d 893 (9th Cir. 2012) (finding that some overlap between FWS’ factors for determining negligible impact and small numbers was not an improper conflation of the two standards where the agency also considered other factors in reaching its conclusions).

would not meet the negligible impact standard. Moreover, even where NMFS can reach a negligible impact finding—which we emphasize does allow for the possibility of some “negligible” population-level impact—the agency must still prescribe practicable measures that will effect the least amount of adverse impact upon the affected species or stock.

Further, section 101(a)(5)(A)(i)(II) requires NMFS to issue, in conjunction with its authorization, binding—and enforceable—restrictions (in the form of regulations) setting forth how the activity must be conducted, thus ensuring the activity has the “least practicable adverse impact” on the affected species or stocks. In situations where mitigation is needed to reach a negligible impact determination, section 101(a)(5)(A)(i)(II) also provides a mechanism for ensuring compliance with the “negligible impact” requirement. Finally, we also reiterate that the “least practicable adverse impact” standard requires mitigation for marine mammal habitat, with particular attention to rookeries, mating grounds, and other areas of similar significance, and for mitigating subsistence impacts; whereas the negligible impact standard is concerned with conclusions about the impact of an activity on the affected populations.⁹

In *NRDC v. Pritzker*, the court stated, “[t]he statute is properly read to mean that even if population levels are not threatened *significantly*, still the agency must adopt mitigation measures aimed at protecting *marine mammals* to the greatest extent practicable in light of military readiness needs.” *Id.* at 1134 (emphasis added). This statement is consistent with our understanding stated above that even when the effects of an action satisfy the negligible impact standard (*i.e.*, in the court’s words, “population levels are not threatened significantly”), still the agency must prescribe mitigation under the least practicable adverse impact standard. However, as the statute indicates, the focus of both standards is ultimately the impact on the affected “species or stock,” and not solely focused on/directed at the impact on individual marine mammals.

We have carefully reviewed and considered the Ninth Circuit’s opinion in *NRDC v. Pritzker* in its entirety. While the court’s reference to “marine mammals” rather than “marine mammal species or stocks” in the italicized

⁹Outside of the military readiness context, mitigation may also be appropriate to ensure compliance with the “small numbers” language in MMPA sections 101(a)(5)(A) and (D).

language above might be construed as a holding that the least practicable adverse impact standard applies at the individual “marine mammal” level, *i.e.*, that NMFS must require mitigation to minimize impacts to each individual marine mammal unless impracticable, we believe such an interpretation reflects an incomplete appreciation of the court’s holding. In our view, the opinion as a whole turned on the court’s determination that NMFS had not given separate and independent meaning to the least practicable adverse impact standard apart from the negligible impact standard, and further that the court’s use of the term “marine mammals” was not addressing the question of whether the standard applies to individual animals as opposed to the species or stock as a whole. We recognize that while consideration of mitigation can play a role in a negligible impact determination, consideration of mitigation extends beyond that analysis. In evaluating what mitigation is appropriate, NMFS considers the impacts of the proposed action, the availability of measures to minimize those potential impacts, and the practicability of implementing those measures, as we describe below.

Implementation of Least Practicable Adverse Impact

Given this most recent court decision, we further clarify how we determine whether a measure or set of measures meets the “least practicable adverse impact” standard. Our evaluation of potential mitigation measures includes consideration of two primary factors:

(1) The manner in which, and the degree to which, implementation of the measure(s) is expected to reduce impacts to marine mammal species or stocks, their habitat, and their availability for subsistence uses (where relevant). Among other things, this analysis will consider the nature of the potential adverse impact (such as likelihood, scope, and range), the likelihood that the measure will be effective if implemented, and the likelihood of successful implementation.

(2) The practicability of the measures for applicant implementation. Practicability of implementation may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. 16 U.S.C. 1371(a)(5)(A)(ii).

While the language of the least practicable adverse impact standard

calls for minimizing impacts to affected species or stocks, we recognize that the reduction of impacts to those species or stocks accrues through the application of mitigation measures that limit impacts to individual animals. Accordingly, NMFS' analysis will focus on measures designed to avoid or minimize impacts on marine mammals from activities that are likely to increase the probability or severity of population-level effects. While direct evidence of impacts to species or stocks from a specified activity is rarely available, and additional study is still needed to describe how specific disturbance events affect the fitness of individuals of certain species, there have been improvements in understanding the process by which disturbance effects are translated to the population. With recent scientific advancements (both marine mammal energetic research and the development of energetic frameworks), the relative likelihood or degree of impacts on species or stocks may often be inferred given a detailed understanding of the activity, the environment, and the affected species or stocks. This same information is used in the development of mitigation measures and helps us understand how mitigation measures contribute to lessening species or stock effects.

In the evaluation of specific measures, the details of the specified activity will necessarily inform each of the two factors and will be carefully considered to determine the types of mitigation that are appropriate under the least practicable adverse impact standard. The greater the likelihood that a measure will contribute to reducing the probability or severity of adverse impacts to the species or stock, the greater the weight that measure(s) is given when considered in combination with practicability to determine the appropriateness of the mitigation measure(s), and vice versa.

Below we discuss how these factors are considered.

1. Reduction of adverse impacts to species or stock. The emphasis given to a measure's ability to reduce the impacts on a species or stock considers the degree, likelihood, and context of the anticipated reduction of impacts to individuals as well as the status of the species or stock.

The ultimate impact on any individual from a disturbance event (which informs the likelihood of adverse species or stock-level effects) is dependent on the circumstances and associated contextual factors, such as duration of exposure to stressors. Though any proposed mitigation needs

to be evaluated in the context of the specific activity and the species or stocks affected, measures with the following types of goals are often applied to reduce the likelihood or severity of adverse species or stock-level impacts: Avoiding or minimizing injury or mortality; limiting interruption of known feeding, breeding, mother/young, or resting behaviors; minimizing the abandonment of important habitat (temporally and spatially); minimizing the number of individuals subjected to these types of disruptions; and limiting degradation of habitat. Mitigating these types of effects is intended to reduce the likelihood that the activity will result in energetic or other types of impacts that are more likely to result in reduced reproductive success or survivorship. It is also important to consider the degree of impacts that were expected in the absence of mitigation in order to assess the added value of any potential measures.

The status of the species or stock is also relevant in evaluating the appropriateness of certain mitigation measures in the context of least practicable adverse impact. The following are examples of factors that may (either alone, or in combination) result in greater emphasis on the importance of a mitigation measure in reducing impacts on a species or stock: The stock is known to be decreasing or status is unknown, but believed to be declining; the known annual mortality (from any source) is approaching or exceeding the potential biological removal (PBR) level (as defined in 16 U.S.C. 1362(20)); the affected species or stock is a small, resident population; or the stock is involved in an unusual mortality event (UME) or has other known vulnerabilities, such as recovering from an oil spill.

Reduction of habitat impacts. Habitat mitigation, particularly as it relates to rookeries, mating grounds, and areas of similar significance, is also relevant and can include measures, such as reducing impacts of the activity on known prey utilized in the activity area or reducing impacts on physical habitat.

Likely effectiveness of the measure. We consider available information indicating the likelihood of any measure to accomplish its objective. If evidence shows that a measure has not typically been effective or successful, then either that measure should be modified, or the potential value of the measure to reduce effects is lowered.

2. Practicability. Factors considered may include cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the

effectiveness of the military readiness activity. 16 U.S.C. 1371(a)(5)(A)(ii).

The above section describes the factors considered in making a least practicable adverse impact finding. In summary, NMFS will carefully balance the likelihood and degree to which a measure(s) will reduce adverse impacts on species or stocks with the measure's practicability in determining appropriate mitigation measures.

NMFS reviewed the proposed activities and the proposed mitigation measures as described in the Navy's LOA application to determine if they would result in the least practicable adverse effect on marine mammal species or stocks. NMFS described the Navy's proposed mitigation measures in detail in the proposed rule (81 FR 9950, 9978-86; February 26, 2016). As described below and in responses to comments, and in the GOA FSEIS/OEIS, some additional measures were also considered and analyzed. Time/area specific mitigation measures considered by the Navy and NMFS for the Navy's low use of hull-mounted mid-frequency active sonar and explosives activities in certain areas of particular importance to specific marine mammals have been clarified and described below (see "Consideration of Time/Area Limitations") and in the "Comments and Responses" section of this rule. This final rule includes the adoption of a new "Cautionary Area" for North Pacific right whales. This additional time/area specific measure is also included in the regulatory text (see § 218.154 Mitigation) at the end of this rule. Other additional mitigation measures were considered but ultimately not chosen for implementation because they were unlikely to reduce impacts to marine mammals or implementation was considered unacceptable with regard to personal safety, practicality of implementation, and impact on effectiveness of the military readiness activity. Separately, as mentioned previously, live MISSILEX exercises were eliminated from the Navy's proposed activities covered under this Final Rule and, therefore, the associated mitigation measures for live MISSILEX exercises that were included in the proposed rule have been removed from the Final Rule. In addition, further details were added to one of the mitigation zones regarding close approaches to marine mammals by vessels to clarify when it is applicable.

Below are the mitigation measures as agreed upon by the Navy and NMFS. For additional details regarding the Navy's mitigation measures, see the "Proposed Mitigation" section of the

proposed rule (81 FR 9950, 9978–86; February 26, 2016) and Chapter 5 in the GOA FSEIS/OEIS.

Lookouts

The Navy shall have two types of Lookouts for the purposes of conducting visual observations: Those positioned on ships; and those positioned ashore, in aircraft, or on small boats. Lookouts positioned on ships shall diligently observe the air and surface of the water. They shall have multiple observation objectives, which include but are not limited to detecting the presence of biological resources and recreational or fishing boats, observing the mitigation zones, and monitoring for vessel and personnel safety concerns.

Due to manning and space restrictions on aircraft, small boats, and some Navy ships, Lookouts for these platforms may be supplemented by the aircraft crew or pilot, boat crew, range site personnel, or shore-side personnel. Lookouts positioned in minimally manned platforms may be responsible for tasks in addition to observing the air or surface of the water (*e.g.*, navigation of a helicopter or small boat). However, all Lookouts shall, considering personnel safety, practicality of implementation, and impact on the effectiveness of the activity, comply with the observation objectives described above for Lookouts positioned on ships.

The procedural measures described in the remainder of this section primarily consist of having Lookouts during specific training activities.

All personnel standing watch on the bridge, Commanding Officers, Executive Officers, maritime patrol aircraft aircrews, anti-submarine warfare helicopter crews, civilian equivalents, and Lookouts shall successfully complete the United States Navy Marine Species Awareness Training prior to standing watch or serving as a Lookout. Additional details on the Navy's Marine Species Awareness Training can be found in the GOA FSEIS/OEIS. The Navy shall use one or more Lookouts during the training activities described below, which are organized by stressor category.

Non-Impulsive Sound

Hull Mounted Mid-Frequency Active Sonar (MFAS)

The Navy's previous Lookout mitigation measures during training activities involving hull-mounted MFAS in the GOA TMAA included requirements such as the number of personnel on watch and the manner in which personnel are to visually search the area in the vicinity of the ongoing

activity. The Navy shall maintain the number of Lookouts required by the Phase I incidental take rule and LOA for the GOA TMAA for ships using hull-mounted MFAS.

Ships using hull-mounted MFAS sources associated with ASW activities at sea (with the exception of ships less than 65 ft (20 m) in length, which are minimally manned) will have two Lookouts at the forward position. While using hull-mounted MFAS sources underway, vessels less than 65 ft (20 m) in length and ships that are minimally manned shall have one Lookout at the forward position due to space and manning restrictions.

High-Frequency and Non-Hull-Mounted Mid-Frequency Active Sonar

The Navy plans to conduct activities using high-frequency and non-hull-mounted MFAS in the Study Area. Non-hull-mounted MFAS training activities include the use of aircraft deployed sonobuoys, helicopter dipping sonar, and submarine sonar. During those activities, the Navy shall employ the following mitigation measures regarding Lookout procedures:

- Navy aircraft participating in exercises at sea shall conduct and maintain, when operationally feasible and safe, surveillance for marine species of concern as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties.
- Helicopters shall observe/survey the vicinity of an ASW training event for 10 minutes before the first deployment of active (dipping) sonar in the water.

The Navy shall continue to use the number of Lookouts (one) required by the Phase I incidental take rule and LOA for the GOA TMAA for ships or aircraft conducting non-hull-mounted MFA sonar activities.

The Phase I incidental take rule and LOA for the GOA TMAA did not include mitigation measures for other high-frequency active sonar activities associated with ASW, or for new platforms; therefore, the Navy shall add a new Lookout and other measures for these activities and on these platforms when conducted in the Study Area. The measure is: The Navy shall have one Lookout on ships conducting high-frequency or non-hull mounted mid-frequency active sonar activities associated with ASW activities at sea.

Explosives and Impulsive Sound

Improved Extended Echo Ranging Sonobuoys

The Navy is not proposing use of Improved Extended Echo Ranging

Sonobuoys during the GOA TMAA training activities.

Explosive Signal Underwater Sound Buoys Using >0.5–2.5 Pound Net Explosive Weight

The previous, and first, incidental take rule and LOA (Phase I) for the GOA TMAA did not include lookout measures for explosive signal underwater sound (SUS) buoy activities using >0.5–2.5 pound (lb.) NEW. The Navy shall add this measure. Aircraft conducting SUS activities using >0.5–2.5 lb. NEW will have one Lookout.

Gunnery Exercises—Small-, Medium-, and Large-Caliber Using a Surface Target

The following Lookout procedures during gunnery exercises are included:

- From the intended firing position, trained Lookouts shall survey the mitigation zone for marine mammals prior to commencement and during the exercise as long as practicable.
- Target towing vessels shall maintain a Lookout. If a marine mammal is sighted in the vicinity of the exercise, the tow vessel shall immediately notify the firing vessel in order to secure gunnery firing until the area is clear.

The Navy shall continue using these Lookout procedures previously implemented for this activity. The Navy shall have one Lookout on the vessel or aircraft conducting small-, medium-, or large-caliber gunnery exercises against a surface target. Towing vessels shall also maintain one Lookout.

Missile Exercises Using a Surface Target

The following Lookout procedures during missile exercises are included:

- Aircraft shall visually survey the target area for marine mammals. Visual inspection of the target area shall be made by flying at 1,500 ft (457 m) or lower, if safe to do so, and at slowest safe speed.
- Firing or range clearance aircraft must be able to actually see ordnance impact areas.

The Navy shall continue using the Lookout procedures previously implemented for this activity. When aircraft are conducting missile exercises against a surface target, the Navy shall have one Lookout positioned in an aircraft.

Bombing Exercises (Explosive)

The following Lookout procedures during bombing exercises are included:

- If surface vessels are involved, Lookouts shall survey for floating kelp and marine mammals.
- Aircraft shall visually survey the target and mitigation zone for marine

mammals prior to and during the exercise. The survey of the impact area shall be made by flying at 1,500 ft (460 m) or lower, if safe to do so, and at the slowest safe speed. Release of ordnance through cloud cover is prohibited: aircraft must be able to actually see ordnance impact areas. Survey aircraft should employ most effective search tactics and capabilities.

The Navy shall continue implementing these measures for bombing exercises, and shall have one Lookout positioned in an aircraft conducting bombing exercises, and trained Lookouts in any surface vessels involved.

Weapons Firing Noise During Gunnery Exercises

The Navy shall continue using the number of Lookouts previously required by the Phase I GOA incidental take rule and LOA for gunnery exercises. The Navy shall have one Lookout on the ship conducting explosive and non-explosive gunnery exercises. This may be the same Lookout described for Gunnery Exercises—Small-, Medium-, and Large-Caliber Using a Surface Target when that activity is conducted from a ship against a surface target.

Physical Disturbance and Strike Vessels

The Navy shall employ the following Lookout procedures to avoid physical disturbance and strike of marine mammals during at-sea training:

- While underway, surface vessels shall have at least one Lookout with binoculars, and surfaced submarines shall have at least one Lookout with binoculars. Lookouts already posted for safety of navigation and man-overboard precautions may be used to fill this requirement. As part of their regular duties, Lookouts will watch for and report to the Officer of the Deck the presence of marine mammals.

Non-Explosive Practice Munitions

Gunnery Exercises—Small-, Medium-, and Large-Caliber Using a Surface Target

The Navy employs the same mitigation measures for non-explosive practice munitions—small-, medium-, and large-caliber gunnery exercises—as described above for Gunnery Exercises—Small-, Medium-, and Large-Caliber Using a Surface Target.

The Navy shall continue using the number of Lookouts previously implemented for these activities pursuant to the Phase I incidental take rule and LOA for the GOA TMAA. The Navy shall have one Lookout during

activities involving non-explosive practice munitions (*e.g.*, small-, medium-, and large-caliber gunnery exercises) against a surface target.

Missile Exercises Using a Surface Target

No MISSILEX using live ordnance will be conducted in GOA. When aircraft are conducting non-explosive missile exercises (including exercises using rockets) against a surface target, the Navy shall have one Lookout positioned in an aircraft.

Bombing Exercises (Non-explosive)

The Navy employs the same mitigation measures for non-explosive bombing exercises as described for Bombing Exercises (Explosive).

The Navy shall continue using the same Lookout procedures previously implemented for these activities pursuant to the Phase I incidental take rule and LOA for the GOA TMAA. The Navy will have one Lookout positioned in an aircraft during non-explosive bombing exercises, and trained Lookouts in any surface vessels involved.

Mitigation Zones

The Navy shall use mitigation zones to reduce the potential impacts to marine mammals from training activities. Mitigation zones are measured as the radius from a source. Unique to each activity category, each radius represents a distance that the Navy will visually observe to help reduce injury to marine species. Visual detections of applicable marine species will be communicated immediately to the appropriate watch station for information dissemination and appropriate action. If the presence of marine mammals is detected acoustically, Lookouts posted in aircraft and on surface vessels will increase the vigilance of their visual surveillance. As a reference, aerial surveys are typically made by flying at 1,500 ft (457 m) altitude or lower at the slowest safe speed.

Many of the proposed activities have mitigation measures that were implemented during the Navy's Phase I activities in the GOA TMAA as required by previous environmental documents or consultations. Most of the mitigation zones for activities that involve the use of impulsive and non-impulsive sources were originally designed to reduce the potential for onset of TTS. For the GOA FSEIS/OEIS and the LOA application, the Navy updated the acoustic propagation modeling to incorporate updated hearing threshold metrics (*i.e.*, upper and lower frequency limits), updated density data for marine

mammals, and factors such as an animal's likely presence at various depths. An explanation of the acoustic propagation modeling process can be found in the Determination of Acoustic Effects on Marine Mammals for the Gulf of Alaska Training SEIS/OEIS Technical Report (Marine Species Modeling Team, 2015). Additionally, since publication of the proposed rule, the Navy re-evaluated the range to effects in consideration of the acoustic thresholds in NMFS' new Guidance, which resulted in larger ranges for some explosive sources.

As a result of the updates described above, in some cases the ranges to onset of TTS effects are much larger than previous model outputs (*i.e.*, those used in the first GOA rule (76 FR 25480; May 4, 2011)). Due to the ineffectiveness and unacceptable operational impacts associated with enlarging the mitigation zones to alleviate impacts in these larger areas, the Navy is unable to mitigate for onset of TTS for every activity. For this GOA TMAA analysis, the Navy developed each recommended mitigation zone to avoid or reduce the potential for onset PTS, out to the predicted maximum range. In some cases, where the ranges to effects are smaller than previous models estimated, the mitigation zones were adjusted accordingly to provide consistency across the measures. Mitigating to the predicted maximum range to PTS consequently also mitigates to the predicted maximum range to onset mortality (1 percent mortality), onset slight lung injury, and onset slight gastrointestinal tract injury, since the maximum range to effects for these criteria are shorter than for PTS. Furthermore, in most cases, the predicted maximum range to PTS also consequently covers the predicted average range to TTS. Table 6 summarizes the predicted average range to TTS, average range to PTS, maximum range to PTS, and recommended mitigation zone for each activity category, based on the Navy's acoustic propagation modeling results and updated by consideration of the new acoustic guidance.

The activity-specific mitigation zones are based on the longest range for all the functional hearing groups. The mitigation zone for a majority of activities is driven by either the high-frequency cetaceans or the sea turtles functional hearing groups. Therefore, the mitigation zones are even more protective for the remaining functional hearing groups (*i.e.*, low-frequency cetaceans, mid-frequency cetaceans, and pinnipeds), and likely cover a larger

portion of the potential range to onset of TTS.

Table 6 includes explosive ranges to TTS and the onset of auditory injury, non-auditory injury, slight lung injury,

and mortality. For every source but one proposed for use by the Navy, the mitigation zones included in Table 6 exceed each of these ranges. The TTS range for BOMBEX is larger than the

mitigation zone. The mitigation zones and their associated assessments are provided throughout the remainder of this section.

TABLE 6—PREDICTED RANGES TO EFFECTS AND RECOMMENDED MITIGATION ZONES FOR EACH ACTIVITY CATEGORY

Activity category	Representative source (Bin) ¹	Predicted (longest) average range to TTS	Predicted (longest) average range to PTS	Predicted maximum range to PTS	Mitigation zone ²
Non-Impulse Sound					
Hull-Mounted Mid-Frequency Active Sonar.	SQS-53 ASW hull-mounted sonar (MF1).	3,821 yd. (3,493 m) for one ping.	100 yd. (91 m) for one ping.	Not applicable ..	6 dB power down at 1,000 yd. (914 m); 4 dB power down at 500 yd. (457 m); and shut-down at 200 yd. (183 m).
High-Frequency and Non-Hull Mounted Mid-Frequency Active Sonar.	AQS-22 ASW dipping sonar (MF4).	230 yd. (210 m) for one ping.	20 yd. (18 m) for one ping.	Not applicable ..	200 yd. (183 m).
Explosive and Impulse Sound					
Signal Underwater Sound (SUS) buoys using >0.5–2.5 lb. NEW.	Explosive sonobuoy (E3).	290 yd. (265 m)	113 yd. (103 m)	309 yd. (283 m)	350 yd. (320 m).
Gunnery Exercises—Small- and Medium-Caliber (Surface Target).	40 mm projectiles (E2).	190 yd. (174 m)	83 yd. (76 m) ...	182 yd. (167 m)	200 yd. (183 m).
Gunnery Exercises—Large-Caliber (Surface Target) ³ .	5 in. projectiles (E5).	771 yd. (705 m)	327 yd. (299 m)	327 yd. (299 m)	600 yd. (549 m).
Bombing Exercises ⁴	MK-84 2,000 lb. (E12).	5,430 yd. (4,965 m).	1,772 yd. (1,620 m).	1,851 yd. (1,693 m).	2,500 yd. (2,286 m).

¹ This table does not provide an inclusive list of all sources in a given bins; bins presented here represent the source bin with the largest range to effects within the given activity category.

² Recommended mitigation zones are larger than the modeled injury zones to account for multiple types of sources or charges being used. See Section 5.3.2 of the GOA FSEIS/OEIS and Section 11.2 of the LOA application (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce; see Chapter 11 of the LOA application for a discussion of the biological effectiveness and operational assessments for each activity's recommended mitigation zone.

³ Bin E5 TTS Value corrected from Proposed Rule table to reflect correct GOA-specific value for average TTS (Table 3.8–18 of the GOA FSEIS/OEIS). PTS re-assessed using NOAA's August 2016 revised explosive acoustic criteria applicable to the most sensitive functional hearing group. PTS value for bin E5 was lower than previously modeled range, so TTS not recalculated and TTS value from previous model shown as conservative (over predictive) value. Lower weight bins re-assessed similarly did not result in any values larger than existing values shown.

⁴ Bin E12 PTS and TTS re-assessed using NOAA's August 2016 revised explosive acoustic criteria applicable to the most sensitive functional hearing group.

Notes: lb. = pounds, m = meters, yd. = yards; PTS = Permanent Threshold Shift, TTS = Temporary Threshold Shift.

For some activities specified throughout the remainder of this section, Lookouts may be required to observe for concentrations of detached floating vegetation (Sargassum or kelp paddies), which are indicators of potential marine mammal presence within the mitigation zone. Those specified activities will not commence if floating vegetation (Sargassum or kelp paddies) is observed within the mitigation zone prior to the initial start of the activity. If floating vegetation is observed prior to the initial start of the activity, the activity will be relocated to an area where no floating vegetation is observed. Training will not cease as a result of floating vegetation entering the mitigation zone after activities have commenced. This measure is intended only for floating vegetation detached from the seafloor.

Non-Impulsive Sound

Hull-Mounted Mid-Frequency Active Sonar

Activities that involve the use of hull-mounted MFA sonar will use Lookouts for visual observation from a ship immediately before and during the activity. Mitigation zones for these activities involve powering down the sonar by 6 dB when a marine mammal is sighted within 1,000 yd (914 m) of the sonar dome, and by an additional 4 dB when sighted within 500 yd (457 m) from the source, for a total reduction of 10 dB. Active transmissions will cease if a marine mammal is sighted within 200 yd (183 m). Active transmission will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is 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 2,000 yd (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). Active transmission may resume when dolphins are bow riding because they are out of the main transmission axis of the active sonar while in the shallow-wave area of the ship bow.

High-Frequency and Non-Hull-Mounted Mid-Frequency Active Sonar

Mitigation will include visual observation from a vessel or aircraft (with the exception of platforms operating at high altitudes) immediately before and during active transmission within a mitigation zone of 200 yd (183 m) from the active sonar source. For activities involving helicopter deployed

dipping sonar, visual observation will commence 10 minutes before the first deployment of active dipping sonar. Helicopter dipping and sonobuoy deployment will not begin if concentrations of floating vegetation (kelp paddies), are observed in the mitigation zone. If the source can be turned off during the activity, active transmission will cease if a marine mammal is sighted within the mitigation zone. Active transmission will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is 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 10 minutes for an aircraft-deployed source, (4) the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a vessel-deployed source, (5) the vessel or aircraft has repositioned itself more than 400 yd (370 m) away from the location of the last sighting, or (6) the vessel concludes that dolphins are deliberately closing in to ride the vessel's bow wave (and there are no other marine mammal sightings within the mitigation zone).

Explosives and Impulsive Sound

Explosive Signal Underwater Sound Buoys Using >0.5–2.5 Pound Net Explosive Weight

Mitigation will include pre-exercise aerial monitoring during deployment within a mitigation zone of 350 yd (320 m) around an explosive SUS buoy. Explosive SUS buoys will not be deployed if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone (around the intended deployment location). SUS deployment will cease if a marine mammal is sighted within the mitigation zone. Deployment will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

Passive acoustic monitoring will also be conducted with Navy assets, such as sonobuoys, already participating in the activity. These assets would only detect vocalizing marine mammals within the frequency bands monitored by Navy personnel. Passive acoustic detections would not provide range or bearing to detected animals, and therefore cannot provide locations of these animals. Passive acoustic detections would be

reported to Lookouts posted in aircraft in order to increase vigilance of their visual surveillance.

Gunnery Exercises—Small- and Medium-Caliber Using a Surface Target

Mitigation will include visual observation from a vessel or aircraft immediately before and during the exercise within a mitigation zone of 200 yd (183 m) around the intended impact location. Vessels will observe the mitigation zone from the firing position. When aircraft are firing, the aircrew will maintain visual watch of the mitigation zone during the activity. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is 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 10 minutes for a firing aircraft, (4) the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a firing ship, or (5) the intended target location has been repositioned more than 400 yd (366 m) away from the location of the last sighting.

Gunnery Exercises—Large-Caliber Explosive Rounds Using a Surface Target

Mitigation will include visual observation from a ship immediately before and during the exercise within a mitigation zone of 600 yd (549 m) around the intended impact location. Ships will observe the mitigation zone from the firing position. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

Bombing Exercises (Explosive)

During Phase I activities, the Navy employed the following mitigation zone procedures during bombing exercises:

- Explosive ordnance shall not be targeted to impact within 2,500 yd (2.3

km) of known or observed floating kelp or marine mammals.

- A 2,500 yd (2.3 km) radius mitigation zone shall be established around the intended target.
- The exercise will be conducted only if marine mammals are not visible within the mitigation zone.

The Navy will (1) maintain the previously required mitigation zone to be used for non-explosive bombing activities, (2) revise the mitigation zone procedures to account for predicted ranges to impacts to marine species when high explosive bombs are used, and (3) add a requirement to visually observe for kelp paddies.

Mitigation will include visual observation from the aircraft immediately before the exercise and during target approach within a mitigation zone of 2,500 yd (2.3 km) around the intended impact location for explosive bombs and 1,000 yd (920 m) for non-explosive bombs. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Bombing will cease if a marine mammal is sighted within the mitigation zone. Bombing will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

Weapons Firing Noise During Gunnery Exercises—Large-Caliber

The Navy employed no mitigation zone procedures for this activity in the Study Area during Phase I training activities in the GOA TMAA.

For Phase II activities, the Navy will adopt measures currently used during Navy gunnery exercises in other ranges outside of the Study Area. For all explosive and non-explosive large-caliber gunnery exercises conducted from a ship, mitigation will include visual observation immediately before and during the exercise within a mitigation zone of 70 yd (64 m) within 30 degrees on either side of the gun target line on the firing side. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is 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, or (4) the vessel has repositioned itself more than 140 yd (128 m) away from the location of the last sighting.

Physical Disturbance and Strike

Vessels

The Navy will use a 500 yd (457 m) mitigation zone for whales, and a 200 yd (183 m) mitigation zone for all other marine mammals. Vessels will avoid approaching marine mammals head on and will maneuver to maintain a mitigation zone of 500 yd (457 m) around observed whales and 200 yd (183 m) around all other marine mammals (except bow-riding dolphins), providing it is safe to do so. These requirements will not apply if a vessel's safety is threatened, such as when change of course will create an imminent and serious threat to a person, vessel, or aircraft, and to the extent vessels are restricted in their ability to maneuver. Restricted maneuverability includes, but is not limited to, situations when vessels are engaged in dredging, submerged activities, launching and recovering aircraft or landing craft, minesweeping activities, replenishment while underway, and towing activities that severely restrict a vessel's ability to deviate course. While in transit, Navy vessels shall be alert at all times, use extreme caution, and proceed at a "safe speed" so that the vessel can take proper and effective action to avoid a collision with any sighted object or disturbance, including any marine mammal or sea turtle, and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

Towed In-Water Devices

The Navy employed no mitigation zone procedures for this activity in the Study Area during Phase I training activities in the GOA TMAA.

During Phase II activities in the GOA TMAA, the Navy will adopt measures currently used in other ranges outside of the Study Area during activities involving towed in-water devices. The Navy will ensure that towed in-water devices being towed from manned platforms avoid coming within a mitigation zone of 250 yd (229 m) around any observed marine mammal, providing it is safe to do so.

Non-Explosive Practice Munitions

Gunnery Exercises—Small-, Medium-, and Large-Caliber Using a Surface Target

The Navy will employ the same mitigation measures for non-explosive gunnery exercises as described above for Gunnery Exercises—Small-, Medium-, and Large-Caliber Using a Surface Target.

Mitigation will include visual observation from a vessel or aircraft immediately before and during the exercise within a mitigation zone of 200 yd (183 m) around the intended impact location. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is 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 10 minutes for a firing aircraft, (4) the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a firing ship, or (5) the intended target location has been repositioned more than 400 yd (366 m) away from the location of the last sighting.

Bombing Exercises (Non-explosive)

Mitigation will include visual observation from the aircraft immediately before the exercise and during target approach within a mitigation zone of 1,000 yd (914 m) around the intended impact location. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Bombing will cease if a marine mammal is sighted within the mitigation zone. Bombing will recommence if any one of the following conditions is met: (1) The animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

Consideration of Time/Area Limitations Biologically Important Areas

The Navy's and NMFS' analysis of effects to marine mammals considers the best available science regarding locations where cetaceans are known to engage in specific activities (*e.g.*, feeding, breeding/calving, or migration) at certain times of the year that are

important to individual animals as well as populations of marine mammals or where small resident populations may be found (see discussion in Van Parijs, 2015). Where data were available, Van Parijs (2015) identified areas that are important in this way and named the areas Biologically Important Areas (BIAs). It is important to note that the BIAs were not meant to define exclusionary zones, nor were they meant to be locations that serve as sanctuaries from human activity, or areas analogous to marine protected areas (see Ferguson *et al.* (2015a) regarding the envisioned purpose for the BIA designations). NMFS' recognition of an area as biologically important for some species activity is not equivalent to designation of critical habitat under the Endangered Species Act (ESA). Furthermore, the BIAs identified by NMFS in and around the Study Area do not represent the totality of important habitat throughout the marine mammals' full range. The delineation of BIAs does not have direct or immediate regulatory consequences, although it is appropriate to consider them as part of the body of science that may inform mitigation decisions, depending on the circumstances. The intention was that the BIAs would serve as resource management tools and that they be considered along with, and not to the exclusion of, "existing density estimates, range-wide distribution data, information on population trends and life history parameters, known threats to the population, and other relevant information" (Van Parijs, 2015). The Navy and NMFS have supported and will continue to support the Cetacean and Sound Mapping project, including representation on the Cetacean Density and Distribution Working Group (CetMap), which informed NMFS' identification of BIAs. The same marine mammal density data present in the Navy's Marine Species Density Database Technical Report (U.S. Department of the Navy, 2014) and used in the analysis for the GOA SEIS/OEIS was used in the development of BIAs. The final products, including the Gulf of Alaska BIAs, from this mapping effort were completed and published in March 2015 (Aquatic Mammals, 2015; Calambokidis *et al.*, 2015; Ferguson *et al.*, 2015a, 2015b; Van Parijs, 2015). 131 BIAs for 24 marine mammal species, stocks, or populations in seven regions within U.S. waters were identified (Ferguson *et al.*, 2015a). BIAs have been identified in the Gulf of Alaska and include migration and feeding areas for gray whale and North Pacific right whale, respectively. Fin whale feeding areas

(east, west, and southwest of Kodiak Island) occur to the west of the GOA TMAA and gray whale feeding areas occur both east (Southeast Alaska) and west (Kodiak Island) of the GOA TMAA; however, these feeding areas are located well outside of (>20 nautical miles) the Study Area and beyond the Navy's estimated range to effects for Level A and B harassment.

NMFS' Office of Protected Resources routinely considers available information about marine mammal habitat use to inform discussions with applicants regarding potential spatio-temporal limitations on their activities that might help effect the least practicable adverse impact on species or stocks and their habitat. BIAs are useful tools for planning and impact assessments and are being provided to the public via this Web site: www.cetsound.noaa.gov. While these BIAs are useful tools for analysts, any decisions regarding protective measures based on these areas must go through the normal MMPA evaluation process (or any other statutory process that the BIAs are used to inform); the identification of a BIA does not presuppose any specific management decision associated with those areas, nor does it have direct or immediate regulatory consequences. NMFS and the Navy have discussed the BIAs listed above, what Navy activities take place in these areas (in the context of what their effects on marine mammals might be or whether additional mitigation is necessary), and what measures could be implemented to reduce impacts in these areas (in the context of their potential to reduce marine mammal species or stock-level impacts and their practicability). An assessment of the potential spatio-temporal and activity overlap of Navy training activities with the Gulf of Alaska BIAs listed above is included below and in Chapter 3.8 of the GOA FSEIS/OEIS. If, through the adaptive management process or otherwise, it becomes apparent that certain other time-area measures are warranted or are practicable, NMFS and Navy will evaluate these measures within the context of the least practicable impact requirement.

Spatial and Temporal Overlap with North Pacific Right Whale Feeding Area—The feeding area for North Pacific right whales (see Ferguson *et al.*, 2015b) overlaps slightly with the GOA TMAA's southwestern corner. This feeding area is applicable from June to September so there is temporal overlap with the proposed Navy training but there is minimal spatial overlap between this feeding area and the GOA

TMAA (see Figure 3.8–2 of the GOA FSEIS/OEIS).

Given their current extremely low population numbers (the North Pacific right whale is one of the most endangered whale species in the world with approximately 31 individuals) and the general lack of sightings in the Gulf of Alaska, the occurrence of right whales in the GOA TMAA is considered rare. North Pacific right whales have not been visually detected in the GOA TMAA since at least the 1960s and there are no current known detections in the portion of the feeding area that overlaps with the GOA TMAA. The Quinn Seamount passive acoustic detections in summer 2013 (Sirović *et al.*, 2014) are the only known potential occurrence records of this species in the GOA TMAA in recent years. The Navy's effects analysis predicts the potential for up to only three Level B behavioral takes annually to North Pacific right whales. These takes are reflected in this final rule. This analysis was based on assigning a nominal North Pacific right whale density to the entire GOA TMAA to account for historic and potential future occurrence in all areas of the TMAA both onshelf and offshelf, and not just associated with the feeding area. However, as discussed above, North Pacific right whales have only potentially been detected in a small portion of the GOA TMAA. Therefore, this predicted level of take is highly conservative.

Spatial and Temporal Overlap with Gray Whale Migratory Area—The migration area for gray whales, which was bounded by the extent of the continental shelf (as provided in Ferguson *et al.*, 2015b), has slight (approximately 1 percent) overlap with the GOA TMAA at its northernmost corner and western edge (see Ferguson *et al.*, 2015b; See Figure 3.8–4 of the GOA FSEIS/OEIS). However, this migration area is applicable only between March to May (Spring) and November to January (Fall) (Ferguson *et al.*, 2015b). This gray whale migration area would not be applicable during the months when training has historically occurred (June/July) and would have minimal temporal overlap with most of the proposed timeframe (April to October; summer) for Navy training in the GOA TMAA. The Navy's acoustic analysis did not predict any takes of gray whales in the GOA TMAA based on acoustic effects modeling that considered gray whale occurrence and density as well as the types and quantities of Navy training being authorized, and NMFS is not authorizing any takes of this species (see

Group and Species-Specific Analysis section later in this final rule).

Analysis of Potential Training Overlap with BIAs—The Location of the GOA TMAA affords aircraft from Navy carrier strike groups supporting joint exercises with the Air Force ability to reach inland established Air Force and Army instrumented land ranges where they conduct air to air ground training. The location of the GOA TMAA also allows appropriate distance limitations to support Air Force aircraft reaching the TMAA without needing to refuel to conduct training at sea with the carrier strike group. Therefore, the GOA TMAA as currently sited is dependent on these location-specific factors to satisfy safety and practicality concerns. However, it is unlikely that Navy training using hull-mounted mid-frequency active sonar or explosives training would occur in these nearshore locations adjacent to the GOA TMAA boundary where the overlap with BIAs occurs. To ensure that the Navy is able to conduct realistic training, Navy units must maintain sufficient room to maneuver. Therefore, training activities using sonar and explosives will typically take place some distance away from an operating area boundary to ensure sufficient sea or air space is available for tactical maneuvers within an approved operating area such as the GOA TMAA. The Navy also does not typically train next to any limiting boundary of the GOA TMAA because it precludes tactical consideration of the adjacent sea space and airspace beyond the boundary from being a potential threat axis during activities such as anti-submarine warfare training. It is also the case that Navy training activities will generally not be located where it is likely there would be interference from civilian vessels and aircraft that are not participating in the training activity. The nearshore boundary of the GOA TMAA is the location for multiple commercial vessel transit lanes, ship traffic, and low-altitude air routes, which all pass through the feeding area and the migration area (see Figure 3.8–9 of the GOA FSEIS/OEIS). This level of civilian activity may otherwise conflict with Navy training activities if those Navy activities were located at that margin of the GOA TMAA and as a result such an area is generally avoided. There are northeastern and northwestern areas of the GOA TMAA, portions of which overlap the BIAs, that could be used for other non-acoustic and non-explosive Navy training events, including vessel movements. As detailed in the GOA FSEIS/OEIS, these could include up to 24 Visit, Board,

Search, and Seizure training activities and 28 Maritime Interdiction training activities which often interact with participating contracted commercial vessels homeported out Gulf of Alaska ports (e.g., Kodiak, Homer, etc.).

Conclusion for North Pacific Right Whale BIA—After evaluating the potential training overlap with the North Pacific right whale BIA and the activities expected to result in the take of this species, the endangered status of the species, the extremely small numbers of North Pacific right whales, and the practicability of implementation, NMFS is requiring—and Navy has agreed to—a North Pacific right whale “Cautionary Area” between June and September in the overlapping 2,051 km² portion of the North Pacific right whale feeding area (See Figure 3.8–4 of the GOA FSEIS/OEIS), in which the Navy would agree no hull-mounted sonar or explosives would be used within the portion of the feeding area that overlaps the Navy’s GOA TMAA during those months. In the event of national security needs, the Navy would be required to seek approval in advance from the Commander, U.S. Third Fleet prior to conducting training activities using sonar or explosives. NMFS believes that implementation of this North Pacific right whale Cautionary Area within the GOA TMAA may provide additional protection of this species and stock beyond the mitigation measures already proposed by the Navy in the proposed rule and GOA FSEIS/OEIS, especially when factoring in their small population size, the status and abundance of the stock (well below its Optimum Sustainable Population (Muto *et al.*, 2016)), and the extremely limited current information about this species. NMFS believes that this additional mitigation measure may contribute to reducing the number of individual North Pacific right whales taken through exposure to MFAS/HFAS or underwater detonations in an area/time that is important for feeding, which could contribute to a reduction in the probability or severity of adverse impacts on the species or stock or their habitat.

Conclusion for Gray Whale BIA—In the case of the gray whale migratory area, given the extremely minimal geographic and temporal overlap with Navy training activities in the GOA TMAA, coupled with the fact that no takes of gray whale are predicted to occur with the proposed level of training effort, NMFS has determined that additional mitigation measures related to time/area limitations of Navy training activities within the

overlapping portion of the migratory area would not contribute to any lessening of the likelihood of adverse impacts on the species or stocks or their habitat, and are therefore not warranted in the context of the least practicable impact standard.

Marine Protected Areas

Marine protected areas (MPAs) in the National System of MPAs potentially occurring within the Study Area are listed and described in Section 6.1.2 of the GOA FSEIS/OEIS (Marine Protected Areas, Table 6.1–2). As shown in Figure 6.1–1 of the GOA FSEIS/OEIS very few MPA are located within the GOA TMAA. MPAs vary widely in purpose, level of protection, and restrictions on human uses. As discussed in the GOA FSEIS/OEIS, MPAs in the vicinity of the GOA TMAA generally focus on natural heritage, fishery management, and sustainable production. The GOA FSEIS/OEIS has been prepared in accordance with the requirements to avoid harm to the natural and cultural resources of existing National System MPAs. The identified impacts and purpose for the designation of these areas is to limit or restrict specific fishing activities. Navy activities, should they occur within or near a MPA, would fully abide by the regulations of the individual MPA, including designated fishery management habitat protection areas, and relevant resources (in the case of the GOA TMAA, mainly restrictions on commercial and recreational fishing) (see Table 6.1–2 of the GOA FSEIS/OEIS for more information). Further, NMFS’ issuance of an authorization to the Navy to take marine mammals would not conflict with the management, protection, or conservation objectives of these MPAs. Therefore, NMFS has determined that Navy avoidance of these areas is not warranted, nor would it contribute to the least practicable impact standard or any lessening of the likelihood of adverse impacts on species or stocks or their habitat.

Seamounts

As with previous Navy Phase II proposed rulemakings, commenters have requested that the Navy avoid training activities in the vicinity of seamounts or seamount chains, which represent potentially important habitat for marine species. Numerous seamounts are located partially or wholly within the TMAA, including seamount habitat protection areas designated by the North Pacific Fishery Management Council to help maintain productivity of fishery resources. However, NMFS does not believe that

Navy avoidance of these areas is warranted, or will contribute to the least practicable impact standard or any lessening of the likelihood of adverse impacts on marine mammal species or stocks for the following reasons:

If marine mammals are known to prefer certain *types* of areas (as opposed to specific areas) for certain functions, such as beaked whale use of seamounts or marine mammal use of other productive areas, it is less effective to require avoidance or limited use of a specific area because marine mammals may or may not be present. NMFS recognizes the generally biologically productive nature of seamounts; however, there are no data to suggest that biologically important or species-specific marine mammal habitat (rookeries, reproductive, feeding) exists along seamounts within the GOA TMAA. While seamounts may represent important habitat for multiple species, the major seamounts located within the TMAA (e.g., Dall, Quinn, and Giacomini seamounts) have been designated by NOAA as Gulf of Alaska Seamount Habitat Protection Areas specifically to help maintain productivity of fisheries resources through restrictions on bottom fishing. Moreover, NMFS’ review of the passive acoustic monitoring results in the Navy’s annual monitoring reports (2011–2015, available at the Navy’s Marine Species Monitoring web portal (<http://www.navymarinespecies.monitoring.us/>)) for GOA generally does not suggest significantly greater use of these seamounts by marine mammals (at least for those where high-frequency acoustic recording packages (HARPs) were deployed; it is also important to note that an animal may be located several miles away from where it is detected) compared to other locations (shelf and slope) where detections were recorded. Navy monitoring efforts indicate that beaked whales appear to use both shelf and seamount sites, although detections were generally low at the monitored seamount sites within the TMAA and may be more prevalent at the slope site. During a summer 2013 visual and passive acoustic survey of the entire GOA TMAA, beaked whale passive acoustic detections were just as frequent over deep water abyssal plain areas of the TMAA as compared to slopes and seamounts (Rone *et al.*, 2014). Fin and humpback callings peaked in winter when Navy activities are not proposed to occur. Fin and sperm whale detections were generally more prevalent at shelf and slope sites, respectively, while blue whale calls were detected at all sites. North Pacific right whale calls were last detected in

2013, on the Quinn Seamount site; however, analysis of these detections indicated that the calls were detected from ranges on the order of roughly up to 50 nm to the east of the site; the calling animal was not in the vicinity of Quinn Seamount (Debich *et al.*, 2014; Sirović *et al.*, 2014).

The Navy has been training with sonar and other systems for decades in locations having seamounts or slope areas, or that are adjacent to continental shelves where, to date, there has been no evidence of any long-term consequences for individuals or populations of marine mammals generally or around seamounts. This finding is based on years of research and monitoring that show, for example, higher densities and long-term residency by species such as beaked whales in Southern California, where the Navy trains and tests, than in other adjacent areas (Falcone *et al.*, 2009; Falcone and Schorr, 2012, 2014; Hildebrand and McDonald, 2009). Further, the Navy has identified the need to train in varied bathymetric conditions, including around seamounts specifically, to afford realistic training. Restricting Navy maneuvering or sonar/explosives training in these areas would alter realistic training to a degree that could impede ability to have sufficient sea or air space for the necessary tactical maneuvers.

When the impact on the effectiveness of the training is considered along with the facts described above (*i.e.*, the fact that Navy monitoring has not indicated a strong preference for the GOA TMAA seamounts by marine mammal species, indicating only limited potential to reduce impacts to marine mammal species or stocks and their habitat), we determined that avoidance of seamounts in the GOA TMAA is not warranted in this particular circumstance.

Stranding Response Plan

NMFS and the Navy developed a Stranding Response Plan for GOA TMAA in 2011 as part of the previous (2011–2016) MMPA authorization and rulemaking process for the Study Area. The Stranding Response Plan is specifically intended to outline the applicable requirements in the event that a marine mammal stranding is reported in the complexes during a major training exercise. NMFS considers all plausible causes within the course of a stranding investigation and this plan in no way presumes that any strandings are related to, or caused by, Navy training activities, absent a determination made during investigation. The plan is designed to address mitigation, monitoring, and compliance. NMFS has updated the

Stranding Response Plan for the GOA TMAA for 2017–2022 training activities. The updated Stranding Response Plan can be found at: http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm#navy_goa2021. In addition, modifications to the Stranding Response Plan may also be made through the adaptive management process.

Mitigation Conclusions

NMFS has carefully evaluated the Navy's proposed mitigation measures—many of which were developed with NMFS' input during the first phase of incidental take authorizations for the Navy's training activities—and considered a broad range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable adverse impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included the manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, their habitat, and their availability for subsistence uses (where relevant). Among other things, this analysis considered the nature of the potential adverse impact (likelihood, scope, range), the likelihood that a measure would be effective if implemented, and the likelihood of effective successful implementation. Our evaluation of potential measures also considered the practicability of the measures for applicant implementation. Practicability of implementation includes consideration of such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Based on our evaluation of the Navy's proposed measures, as well as other measures considered by NMFS, NMFS has determined that the mitigation measures required by this rule are adequate means of effecting the least practicable adverse impacts on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, while also considering personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Monitoring

Section 101(a)(5)(A) of the MMPA states that in order to issue an ITA for

an activity, NMFS must set forth “requirements pertaining to the monitoring and reporting of such taking”. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for LOAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present.

Integrated Comprehensive Monitoring Program (ICMP)

The Navy's ICMP is intended to coordinate monitoring efforts across all regions and to allocate the most appropriate level and type of effort for each range complex based on a set of standardized objectives, and in acknowledgement of regional expertise and resource availability. The ICMP is designed to be flexible, scalable, and adaptable through the adaptive management and strategic planning processes to periodically assess progress and reevaluate objectives. Although the ICMP does not specify actual monitoring field work or projects, it does establish top-level goals that have been developed in coordination with NMFS. As the ICMP is implemented, detailed and specific studies will be developed which support the Navy's top-level monitoring goals. In essence, the ICMP directs that monitoring activities relating to the effects of Navy training and testing activities on marine species should be designed to contribute towards one or more of the following top-level goals:

- An increase in our understanding of the likely occurrence of marine mammals and/or ESA-listed marine species in the vicinity of the action (*i.e.*, presence, abundance, distribution, and/or density of species);
- An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammals and/or ESA-listed species to any of the potential stressor(s) associated with the action (*e.g.*, tonal and impulsive sound), through better understanding of one or more of the following: (1) The action and the environment in which it occurs (*e.g.*, sound source characterization, propagation, and ambient noise levels); (2) the affected species (*e.g.*, life history or dive patterns); (3) the likely co-occurrence of marine mammals and/or ESA-listed marine species with the action (in whole or part) associated with specific adverse effects; and/or (4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and/or ESA-listed marine species (*e.g.*, age class of exposed animals or known pupping, calving or feeding areas);
- An increase in our understanding of how individual marine mammals or ESA-listed

marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, *e.g.*, at what distance or received level);

- An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: (1) The long-term fitness and survival of an individual; or (2) the population, species, or stock (*e.g.*, through effects on annual rates of recruitment or survival);

- An increase in our understanding of the effectiveness of mitigation and monitoring measures;

- A better understanding and record of the manner in which the authorized entity complies with the ITA and Incidental Take Statement; and

- An increase in the probability of detecting marine mammals (through improved technology or methods), both specifically within the safety zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals.

Monitoring would address the ICMP top-level goals through a collection of specific regional and ocean basin studies based on scientific objectives. Quantitative metrics of monitoring effort (*e.g.*, 20 days of aerial surveys) would not be a specific requirement. The adaptive management process and reporting requirements would serve as the basis for evaluating performance and compliance, primarily considering the quality of the work and results produced, as well as peer review and publications, and public dissemination of information, reports, and data. Details of the ICMP are available online (<http://www.navy.marin-species-monitoring.us/>).

Strategic Planning Process for Marine Species Monitoring

The Navy also developed the Strategic Planning Process for Marine Species Monitoring, which establishes the guidelines and processes necessary to develop, evaluate, and fund individual projects based on objective scientific study questions. The process uses an underlying framework designed around top-level goals, a conceptual framework incorporating a progression of knowledge, and in consultation with a Scientific Advisory Group and other regional experts. The Strategic Planning Process for Marine Species Monitoring would be used to set intermediate scientific objectives, identify potential species of interest at a regional scale, and evaluate and select specific monitoring projects to fund or continue supporting for a given fiscal year. This process would also address relative investments to different range complexes based on goals across all

range complexes, and monitoring would leverage multiple techniques for data acquisition and analysis whenever possible. The Strategic Planning Process for Marine Species Monitoring is also available online (<http://www.navy.marin-species-monitoring.us/>).

Past and Current Monitoring in the Study Area

NMFS has received multiple years' worth of annual exercise and monitoring reports addressing active sonar use and explosive detonations within the GOA TMAA and other Navy range complexes. The data and information contained in these reports have been considered in developing mitigation and monitoring measures for the proposed training activities within the Study Area. The Navy's annual exercise and monitoring reports may be viewed at: <http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm> and <http://www.navy.marin-species-monitoring.us>.

This section is a summary of Navy-funded compliance monitoring in the GOA TMAA since 2011. Additional Navy-funded monitoring outside of and in addition to the Navy's commitments to NMFS is provided later in this section.

Gulf of Alaska Study Area Monitoring, 2011–2015—During the LOA development process for the 2011 GOA FEIS/OEIS, the Navy and NMFS agreed that monitoring in the Gulf of Alaska should focus on augmenting existing baseline data, since regional data on species occurrence and density are extremely limited. There have been several reports to date covering work in the Gulf of Alaska (U.S. Department of the Navy, 2011c, 2011d, 2012, 2013f, 2014d, and 2015). Collecting baseline data was deemed a priority prior to focusing on exercise monitoring and behavioral response as is now being done in other Navy OPAREAs and ranges. There have been no previous dedicated monitoring efforts during Navy training activities in the GOA TMAA with the exception of deployed high-frequency acoustic recording packages (HARPs).

In July 2011, the Navy funded deployment of two long-term bottom-mounted passive acoustic monitoring buoys by Scripps Institute of Oceanography (Scripps). These HARPs were deployed southeast of Kenai Peninsula in the GOA TMAA with one on the shelf approximately 50 nm from land (in 111 fathoms (203 m) depth) and on the shelf-break slope approximately 100 nm from land (in 492 fathoms (900 m) depth). Intended to be collected annually, results from the first

deployment (July 2011–May 2012) included over 5,756 hours of passive acoustic data (Baumann-Pickering *et al.*, 2012b). Identification of marine mammal sounds included four baleen whale species (blue whales, fin whales, gray whales, and humpback whales) and at least six species of odontocetes (killer whale, sperm whale, Stejneger's beaked whale, Baird's beaked whale, Cuvier's beaked whale, and an unidentified porpoise presumed to be Dall's porpoise; Baumann-Pickering *et al.*, 2012b). Researchers also noted the detection of anthropogenic sound from commercial shipping. There were no Navy activities or vessels in the area at any time during the recording period.

Analysis of the passive acoustic detections made from May 2012 to June 2013 were presented in Baumann-Pickering *et al.* (2013), Debich *et al.* (2013), Debich *et al.* (2014), and the Navy's 2012, 2013, and 2014 GOA TMAA annual monitoring report submitted to NMFS (U.S. Department of the Navy, 2012, 2013f, 2014d). Three baleen whale species were detected: blue whales, fin whales, and humpback whales. No North Pacific right whale calls were detected at either site during this monitoring period. At least seven species of odontocetes were detected: Risso's dolphins, killer whales, sperm whales, Baird's beaked whales, Cuvier's beaked whales, Stejneger's beaked whales, and unidentified porpoises (likely Dall's porpoise). Focused analysis of beaked whale echolocation recordings were presented in Baumann-Pickering *et al.* (2013).

As also presented in Debich *et al.* (2013) and U.S. Department of the Navy (2013f), broadband ship noise was found to be more common at the slope and Pratt Seamount monitoring sites within the GOA TMAA than at the nearshore (on shelf) site. Sonar (a variety of frequencies, most likely fathometers and fish-finders), were more common on the shelf and slope sites. Very few explosions were recorded at any of the sites throughout the monitoring period. Origin of the few explosions detected are unknown, but there was no Navy explosive use in the GOA TMAA during this period, so these explosive-like events may be related to fisheries activity, lightning strikes, or some other unidentified source. There were no detections of Navy mid-frequency sonar use in the recordings (Debich *et al.*, 2013, 2014; U.S. Department of the Navy 2013f, 2014d). In September 2012, an additional HARP buoy was deployed at Pratt Seamount (near the east end of the GOA TMAA) and in June 2013 two additional buoys were deployed in the GOA TMAA: One

at the shelf-break near the southwest corner of the GOA TMAA and one at Quinn Seamount (the approximate middle of the GOA TMAA's southeast boundary). This constitutes a total of five Navy-funded concurrent long-term passive acoustic monitoring packages present in the GOA TMAA through fall of 2014. Debich *et al.* (2013) reported the first detection of a North Pacific right whale at the Quinn Seamount site. Over two days between June and August 2013, the Quinn seamount HARP detected three hours of North Pacific right whale calls (Debich *et al.*, 2014, Sirović *et al.*, in press). Given the recording device location near the southwest border of the GOA TMAA, inability of the device as configured to determine call directionality, and likely signal propagation of several 10s of miles, it remains uncertain if the detected calls originated within or outside of the GOA TMAA. Previous related Navy funded monitoring at multiple sites within the Study Area reported no North Pacific right whale detections (Baumann-Pickering *et al.*, 2012b, Debich *et al.*, 2013).

Additional monitoring conducted in the GOA TMAA through spring/summer 2015 included the deployment of five HARPs to detect marine mammals and anthropogenic sounds (Rice *et al.*, 2015), and a passive acoustic sensor-mounted Kongsberg Seaglider™ deployment along the continental slope within the TMAA (marine mammal vocalization and echolocation detections from the Seaglider deployment are still undergoing analysis and the technical report will be posted to the Navy's monitoring Web site: <http://www.navy.marinespecies.monitoring.us/>). Four baleen whale species were recorded during the HARP deployment: Blue whales, fin whales, gray whales, and humpback whales. No North Pacific right whale calls were recorded. Across all sites, blue whales, fin whales, and humpback whales were commonly detected throughout the recordings, with fin whale detections generally more prevalent at the shelf site. Humpback whales were one of the most commonly detected baleen whales throughout the recordings. Blue whale calls were most prevalent during the summer and fall, while humpback detections were highest from December through March. Fin whale 20 Hz calls were the dominant call type, peaking from September to December, while 40 Hz calls peaked in the summer months. Signals from three known odontocete species were recorded: sperm whales, Cuvier's beaked whales, and Stejneger's beaked whales. Sperm whales were

detected at every site, but were most prevalent at the continental slope site, with peak detections from June through late November 2014 and again in April to May 2015. Cuvier's beaked whales were detected in low numbers at the seamount sites. Stejneger's beaked whales were detected at the continental slope site, and the seamount sites, with most detections occurring at the continental slope site. The only anthropogenic sounds detected in the recordings were explosions, which Rice *et al.* (2015) attributed to fishery-related seal bombs based on the spectral properties of the signals.

During review of Rice *et al.* (2015), personnel from NMFS' Alaska Fisheries Science Center questioned if some of the seal bomb-like passive acoustic explosive detections could not have been a variation of a North Pacific right whale "gunshot" call. Further explanation was subsequently provided by Scripps: the explosions recorded in the Gulf of Alaska and reported in Rice *et al.* (2015), as well as previous year's reports were broadband, impulsive sounds with a distinctive low frequency rumble. The signal parameters are very similar to seal bomb explosions detect in passive acoustic data from Southern California and the Pacific Northwest. Additionally, Scripps confirmed that from their experience with the detection of seal bombs signals in acoustic data from multiple locations including those outside of Alaska, seal bombs are frequently deployed in a sequence over a period of time, which may be similar to North Pacific right whale bouts. Therefore, Scripps remains confident that the overall patterns and distributions of this signal represent explosives (seal bombs) used in this region and that the likelihood of these explosions being North Pacific right whales is extremely low, even if they cannot absolutely fully discount the possibility that some of their reported explosions may in fact be "gunshot" calls.

No mid-frequency active (MFA) sonar events were detected throughout the 2014–2015 HARP recordings. Future monitoring will include varying numbers of HARPs or other passive acoustic technologies based on annual adaptive management and monitoring meeting discussions with NMFS.

In the Gulf of Alaska, the Navy has also funded two previous marine mammal surveys to gather occurrence and density data. Although there was no regulatory requirement for the Navy to undertake either survey, the Navy funded the data collection to first support analysis of potential effects for the 2011 GOA FEIS/OEIS and again

recently to support the current GOA SEIS/OEIS. The first Navy-funded survey (GOALS) was conducted by NMFS in April 2009 (see Rone *et al.*, 2009). Line-transect survey visual data was gathered to support distance sampling statistics and acoustic data were collected over a 10-day period both within and outside the GOA TMAA. This survey resulted in sightings of several species and allowed for the derivation of densities for fin and humpback whale that supplemented multiple previous survey efforts in the vicinity (Rone *et al.*, 2009). In summer 2013, the Navy funded an additional visual line-transect survey (Gulf of Alaska Line-Transect Survey (GOALS II)) in the offshore waters of the Gulf of Alaska (Rone *et al.*, 2014). The GOALS II survey was a 30-day visual line-transect survey supplemented by use of passive acoustics and was a follow-on effort to the previously Navy-funded GOALS survey in 2009. The primary objective for the GOALS II survey was to acquire baseline data to increase understanding of the likely occurrence (*i.e.*, presence, abundance, distribution and/or density of species) of beaked whales and ESA-listed marine mammals in the Gulf of Alaska. Specific research objectives were:

- Assess the abundance, spatial distribution and/or density of marine mammals, with a focus on beaked whales and ESA-listed cetacean species through visual line-transect surveys and passive acoustics using a towed hydrophone array and sonobuoys.
- Increase knowledge of species' vocal repertoire by linking visual sightings to vocally active cetaceans, in order to improve the effectiveness of passive acoustic monitoring.
- Attempt to photo-identify and biopsy sample individual whales opportunistically for analysis of population structure, genetics and habitat use.
- Attempt to locate whales for opportunistic satellite tagging using visual and passive acoustic methodology in order to provide information on both large- and fine-scale movements and habitat use of cetaceans.

The Navy-funded GOALS II survey also sampled four distinct habitat areas (shelf, slope, offshore, and seamounts) which were partitioned into four strata. The survey design was intended to provide uniform coverage within the Gulf of Alaska. However, given the overall limited knowledge of beaked whales within the Gulf of Alaska, the survey was also designed to provide coverage of potential beaked whale habitat and resulted in 13 encounters with beaked whales numbering 67 individual animals (Rone *et al.*, 2014). The following additional details are

summarized from the presentation in Rone *et al.* (2014). The visual survey consisted of 4,504 km (2,431 nm) of 'full-effort' and included 349 km (188 nm) of 'transit-effort.' There was an additional 375 km (202 nm) of 'fog-effort' (transect and transit). Based on total effort, there were 802 sightings (1,998 individuals) identified to species, with an additional 162 sightings (228 individuals) of unidentified cetaceans and pinnipeds. Acoustic surveying was conducted round-the-clock with a towed-hydrophone array for 6,304 km (3,997 nm) of line-transect effort totaling 426 hours of 'standard' monitoring, with an additional 374 km (202 nm) of approximately 30 hours of 'non-standard' and 'chase' effort. There were 379 acoustic detections and 267 localizations of 6 identified cetacean species. Additionally, 186 acoustic sonobuoys were deployed with 7 identified cetacean species detected. Two satellite transmitter tags were deployed; a tag on a blue whale (*B. musculus*) transmitted for 9 days and a tag on a Baird's beaked whale (*Berardius bairdii*) transmitted for 15 days. Based on photo-identification matches, the tagged blue whale had been previously identified off Baja California, Mexico, in 2005. Photographs of five cetacean species were collected for photo-identification purposes: Fin, humpback, blue, killer (*Orcinus orca*), and Baird's beaked whales. The estimates of abundance and density for five species were obtained for the first time for the central Gulf of Alaska. Overall, the Navy funded GOALS II survey provided one of the most comprehensive datasets on marine mammal occurrence, abundance, and distribution within that rarely surveyed area (Rone *et al.*, 2014).

Pacific Northwest Cetacean Tagging— A Navy-funded effort in the Pacific Northwest is ongoing and involves attaching long-term satellite tracking tags to migrating gray whales off the coast of Oregon and northern California (U.S. Department of the Navy, 2013e). This study is being conducted by the University of Oregon and has also included tagging of other large whale species such as humpback whales, fin whales, and killer whales when encountered. This effort is not programmed, affiliated, or managed as part of the GOA TMAA monitoring, and is a separate regional project, but has provided information on marine mammals and their movements that has application to the Gulf of Alaska.

In one effort between May 2010 and May 2013, satellite tracking tags were placed on three gray whales, 11 fin whales, five humpback whales, and two killer whales off the Washington coast

(Schorr *et al.*, 2013). One tag on an Eastern North Pacific Offshore stock killer whale, in a pod encountered off Washington at Grays Harbor Canyon, remained attached and continued to transmit for approximately three months. In this period, the animal transited a distance of approximately 4,700 nm, which included time spent in the nearshore margins of the TMAA in the Gulf of Alaska where it would be considered part of the Offshore stock (for stock designations, see Muto and Angliss, 2015). In a second effort between 2012 and 2013, tags were attached to 11 Pacific Coast Feeding Group gray whales near Crescent City, California; in general, the tag-reported positions indicated these whales were moving southward at this time of year (Mate, 2013). The Navy's 2013 annual monitoring report for the Northwest Training and Testing Range contains the details of the findings from both research efforts described above (U.S. Department of the Navy, 2013e).

Monitoring for the GOA TMAA Study Area 2017–2022

Based on the NMFS-Navy adaptive management meeting in June 2015 and the annual monitoring meeting in March 2016, future Navy compliance monitoring, including ongoing monitoring, will address ICMP top-level goals through a series of regional and ocean basin study questions with a prioritization and funding focus on species of interest as identified for each range complex. The ICMP will also address relative investments to different range complexes based on goals across all range complexes, and monitoring will leverage multiple techniques for data acquisition and analysis whenever possible.

Within the GOA TMAA Study Area, the Navy's monitoring for GOA TMAA under this LOA authorization and concurrently in other areas of the Pacific Ocean will therefore be structured to address region-specific species-specific study questions in consultation with NMFS. The 2015 annual monitoring report submitted by the Navy to NMFS concludes the Navy's monitoring within the GOA TMAA under the 2011–2016 MMPA authorization. The HARPs used as part of that monitoring effort are currently being retrieved and returned to Scripps Institution of Oceanography for refurbishment. In consultation with NMFS during the June 2015 adaptive management meeting, the Navy and NMFS agreed that Navy-funded monitoring within the GOA TMAA would be revisited during subsequent adaptive management meetings in 2017 and 2018. Given four years of constant

24/7 passive acoustic marine mammal baseline monitoring through the years 2011–2015, scientifically significant ambient background data for a region used infrequently by the Navy has been sufficiently obtained under the 2011–2016 authorization. Therefore, the Navy, with NMFS' concurrence, did not fund GOA TMAA marine mammal monitoring in 2016.

For 2017, Navy will deploy minimum of two bottom-mounted passive acoustic devices with an option for third deep-water buoy passive acoustic device. Devices will be High-frequency acoustic recording packages (HARP) and, for consistency and comparison with past efforts, will be deployed at the same sites as previously. The third planned option consists of a new deep-water open ocean site, on line with the shallower sites, and will include deployment of both a HARP and a new buoy. Scripps will conduct post-deployment of marine mammal vocalizations, ambient sounds and anthropogenic sounds.

Additional Navy monitoring projects proposed during the 2017–2022 GOA TMAA rulemaking period will be posted on the Navy's marine species monitoring Web site (<http://www.navy.marinespeciesmonitoring.us/regions/pacific/current-projects/>). NMFS has acknowledged that the Navy's GOA TMAA monitoring will enhance understanding of marine mammal vocalizations and distributions within the offshore waters of the Gulf of Alaska. Additionally, information gained from the Navy's monitoring may be used in the adaptive management of monitoring measures in subsequent NMFS authorizations, if appropriate and in consultation with NMFS. The Navy is committed to structuring the Navy-sponsored research and monitoring program to address both NMFS' regulatory requirements as part of any MMPA authorizations while at the same time making significant contributions to the greater body of marine mammal science (see U.S. Department of the Navy, 2013f).

Ongoing Navy Research

The U.S. Navy is one of the world's leading organizations in assessing the effects of human activities on the marine environment including marine mammals. From 2004 through 2013, the Navy has funded over \$240 million specifically for marine mammal research. Navy scientists work cooperatively with other government researchers and scientists, universities, industry, and non-governmental conservation organizations in collecting, evaluating, and modeling information

on marine resources. They also develop approaches to ensure that these resources are minimally impacted by existing and future Navy operations. It is imperative that the Navy's research and development (R&D) efforts related to marine mammals are conducted in an open, transparent manner with validated study needs and requirements. The goal of the Navy's R&D program is to enable collection and publication of scientifically valid research as well as development of techniques and tools for Navy, academic, and commercial use. Historically, R&D programs are funded and developed by the Navy's Chief of Naval Operations Energy and Environmental Readiness Division (OPNAV N45) and Office of Naval Research (ONR), Code 322 Marine Mammals and Biological Oceanography Program. The primary focus of these programs since the 1990s is on understanding the effects of sound on marine mammals, including physiological, behavioral, and ecological effects.

ONR's current Marine Mammals and Biology Program thrusts include, but are not limited to: (1) Monitoring and detection research, (2) integrated ecosystem research including sensor and tag development, (3) effects of sound on marine life (such as hearing, behavioral response studies, physiology (diving and stress), and population consequences of acoustic disturbance (PCAD)), and (4) models and databases for environmental compliance.

To manage some of the Navy's marine mammal research programmatic elements, OPNAV N45 developed in 2011 a new Living Marine Resources (LMR) Research and Development Program (<http://www.lmr.navy.mil/>). The goal of the LMR Research and Development Program is to identify and fill knowledge gaps and to demonstrate, validate, and integrate new processes and technologies to minimize potential effects to marine mammals and other marine resources. Key elements of the LMR program include:

- Providing science-based information to support Navy environmental effects assessments for research, development, acquisition, testing and evaluation as well as Fleet at-sea training, exercises, maintenance, and support activities.
- Improving knowledge of the status and trends of marine species of concern and the ecosystems of which they are a part.
- Developing the scientific basis for the criteria and thresholds to measure the effects of Navy generated sound.
- Improving understanding of underwater sound and sound field characterization unique to assessing the biological consequences resulting from underwater sound (as opposed to tactical applications of

underwater sound or propagation loss modeling for military communications or tactical applications).

- Developing technologies and methods to monitor and, where possible, mitigate biologically significant consequences to living marine resources resulting from naval activities, emphasizing those consequences that are most likely to be biologically significant.

Navy Research and Development

Navy Funded—Both the LMR and ONR Research and Development Programs periodically fund projects within the Study Area. Some data and results, when available from these R&D projects, are typically summarized in the Navy's annual range complex Monitoring Reports that are currently submitted to NMFS each year. In addition, the Navy's Range Complex monitoring during training and testing activities is coordinated with the R&D monitoring in a given region to leverage research objectives, assets, and studies where possible under the ICMP.

The integration between the Navy's new LMR Research and Development Program and related range complex monitoring will continue and improve during this LOA application period with applicable results presented in GOA TMAA annual monitoring reports.

Other National Department of Defense Funded Initiatives—Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) are the DoD's environmental research programs, harnessing the latest science and technology to improve environmental performance, reduce costs, and enhance and sustain mission capabilities. The Programs respond to environmental technology requirements that are common to all of the military Services, complementing the Services' research programs. SERDP and ESTCP promote partnerships and collaboration among academia, industry, the military Services, and other Federal agencies. They are independent programs managed from a joint office to coordinate the full spectrum of efforts, from basic and applied research to field demonstration and validation.

Adaptive Management

The final regulations governing the take of marine mammals incidental to Navy training activities in the Study Area contain an adaptive management component, as did previous authorizations. The reporting requirements associated with this final rule are designed to provide NMFS with monitoring data from the previous year to allow NMFS to consider whether any

changes are appropriate. NMFS and the Navy would meet to discuss the monitoring reports, Navy R&D developments, and current science and whether mitigation or monitoring modifications are appropriate. The use of adaptive management allows NMFS to consider new information from different sources to determine (with input from the Navy regarding practicability) on an annual or biennial basis if mitigation or monitoring measures should be modified (including additions or deletions). Mitigation measures could be modified if new data suggests that such modifications would have a reasonable likelihood of reducing adverse effects to marine mammal species or stocks and their habitat and if the measures are practicable.

The following are some of the possible sources of applicable data to be considered through the adaptive management process: (1) Results from monitoring and exercises reports, as required by MMPA authorizations; (2) compiled results of Navy funded R&D studies; (3) results from specific stranding investigations; (4) results from general marine mammal and sound research; and (5) any information which reveals that marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent LOA.

Reporting

In order to issue an ITA for an activity, section 101(a)(5)(A) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking." Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring. NMFS described the proposed Navy reporting requirements in the proposed rule (81 FR 9950, 9991–92; February 26, 2016). Reports from individual monitoring events, results of analyses, publications, and periodic progress reports for specific monitoring projects will be posted to the Navy's Marine Species Monitoring web portal: <http://www.navy.marinespeciesmonitoring.us> and NMFS' Web site: <http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>. There are several different reporting requirements that are further detailed in the regulatory text at the end of this document and summarized below. Of note, a notification requirement for Major Training Exercises that was included in the proposed rule has been modified to be a 72-hour pre-notice, which aligns better with requirements in other training areas and better supports NMFS' management needs.

General Notification of Injured or Dead Marine Mammals

Navy personnel will ensure that NMFS (the appropriate Regional Stranding Coordinator) is notified immediately (or as soon as clearance procedures allow) if an injured or dead marine mammal is found during or shortly after, and in the vicinity of, any Navy training exercise utilizing MFAS, HFAS, or underwater explosive detonations. The Navy will provide NMFS with species identification or a description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photographs or video (if available). The Navy shall consult the Stranding Response Plan to obtain more specific reporting requirements for specific circumstances.

Vessel Strike

NMFS has developed the following language to address monitoring and reporting measures specific to vessel strike. Most of this language comes directly from the Stranding Response Plan for other Navy training and testing rulemakings. This section has also been included in the regulatory text at the end of this final rule. Vessel strike during Navy training activities in the Study Area is not anticipated; however, in the event that a Navy vessel strikes a whale, the Navy shall do the following:

Immediately report to NMFS (pursuant to the established Communication Protocol) the:

- Species identification (if known);
- Location (latitude/longitude) of the animal (or location of the strike if the animal has disappeared);

- Whether the animal is alive or dead (or unknown); and

- The time of the strike.

As soon as feasible, the Navy shall report to or provide to NMFS, the:

- Size, length, and description (critical if species is not known) of animal;

- An estimate of the injury status (*e.g.*, dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared, etc.);

- Description of the behavior of the whale during event, immediately after the strike, and following the strike (until the report is made or the animal is no longer sighted);

- Vessel class/type and operational status;
- Vessel length;
- Vessel speed and heading; and
- To the best extent possible, obtain a photo or video of the struck animal, if the animal is still in view.

Within 2 weeks of the strike, provide NMFS:

- A detailed description of the specific actions of the vessel in the 30-minute timeframe immediately preceding the strike,

during the event, and immediately after the strike (*e.g.*, the speed and changes in speed, the direction and changes in direction, other maneuvers, sonar use, etc., if not classified); and

- A narrative description of marine mammal sightings during the event and immediately after, and any information as to sightings prior to the strike, if available; and use established Navy shipboard procedures to make a camera available to attempt to capture photographs following a ship strike.

NMFS and the Navy will coordinate to determine the services the Navy may provide to assist NMFS with the investigation of the strike. The response and support activities to be provided by the Navy are dependent on resource availability, must be consistent with military security, and must be logistically feasible without compromising Navy personnel safety. Assistance requested and provided may vary based on distance of strike from shore, the nature of the vessel that hit the whale, available nearby Navy resources, operational and installation commitments, or other factors.

Annual GOA TMAA Monitoring Report

The Navy shall submit an annual report of the GOA TMAA monitoring describing the implementation and results from the previous calendar year. Data collection methods will be standardized across range complexes and study areas to allow for comparison in different geographic locations.

Although additional information will be gathered, Navy Lookouts collecting marine mammal data pursuant to the GOA TMAA monitoring plan shall, at a minimum, provide the same marine mammal observation data required in § 218.155. The report shall be submitted either 90 days after the calendar year, or 90 days after the conclusion of the monitoring year to be determined by the adaptive management process. The GOA TMAA Monitoring Report may be provided to NMFS within a larger report that includes the required Monitoring Plan reports from multiple range complexes and study areas (the Multi-Range Complex Annual Monitoring Report). Such a report would describe progress of knowledge made with respect to monitoring plan study questions across all Navy ranges associated with the Integrated Comprehensive Monitoring Program. Similar study questions shall be treated together so that progress on each topic shall be summarized across all Navy ranges. The report need not include analyses and content that does not provide direct assessment of cumulative progress on the monitoring plan study questions.

Annual GOA TMAA Exercise Report

Each year, the Navy shall submit a preliminary report detailing the status of authorized sound sources within 21 days after the anniversary of the date of issuance of the LOA. Each year, the Navy shall submit a detailed report within 3 months after the anniversary of the date of issuance of the LOA. The annual report shall contain information on Major Training Exercises (MTEs), and a summary of all sound sources used (total hours or quantity (per the LOA) of each bin of sonar or other non-impulsive source; total annual number of each type of explosive exercises; and total annual expended/detonated rounds (missiles, bombs, etc.) for each explosive bin). The analysis in the detailed report will be based on the accumulation of data from the current year's report and data collected from previous reports for the rule. Information included in the classified annual reports may be used to inform future adaptive management of activities within the GOA TMAA.

Sonar Exercise Notification

MTE Prior Notification. The Navy shall submit to NMFS (contact as specified in the LOA and Stranding Plan) an electronic notice of pending MTEs 72 hours prior to the start of the MTE indicating: Location of the exercise, beginning and end dates of the exercise, type of exercise.

Five-Year Close-Out Exercise Report

This report will be included as part of the 2022 annual exercise report. This report will provide the annual totals for each sound source bin with a comparison to the annual allowance and the 5-year total for each sound source bin with a comparison to the 5-year allowance. Additionally, if there were any changes to the sound source allowance, this report will include a discussion of why the change was made and include the analysis to support how the change did or did not result in a change in the SEIS and final rule determinations. The report will be submitted 3 months after the expiration of the rule. NMFS will submit comments on the draft close-out report, if any, within 3 months of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 3 months after the submittal of the draft if NMFS does not provide comments.

Comments and Responses

On February 26, 2016, NMFS published a proposed rule (81 FR 9950) in response to the Navy's request to take marine mammals incidental to training

activities in the GOA TMAA Study Area and requested comments, information, and suggestions concerning the request. During the 30-day public comment period, NMFS received comments from the Marine Mammal Commission (Commission), non-governmental organizations, and private citizens. Numerous comments were collectively submitted in a letter on behalf of the Natural Resources Defense Council (NRDC), Animal Welfare Institute, Center for Biological Diversity, Cetacean Society International, Cook Inletkeeper, Copper River Watershed Project, Defenders of Wildlife, Eyak Preservation Council, Eye of the Whale Research, The Humane Society of the United States, International Fund for Animal Welfare, Oasis Earth, Ocean Conservation Research, OceanCare, Peaceful Skies Coalition, Prince William Soundkeeper, Public Employees for Environmental Responsibility (PEER), Tucson Forward, Inc., West Coast Action Alliance, and Whale and Dolphin Conservation (hereinafter referred to as NRDC *et al.*). Several of NRDC *et al.*'s comments, specifically those related to mitigation recommendations (see Comment 23–49), were the same or similar to comments made on the proposed rule for Navy training and testing in the Northwest Training and Testing (NWT) Study Area and which were addressed by NMFS in the final rule for NWT (80 FR 73556, 73575–98; November 24, 2015, Comments and Responses). NMFS also received an online petition, titled “Stop Sonar and Underwater Explosions in Gulf of Alaska,” which originated from a non-governmental organization (Eye of the Whale Research) and was circulated by MoveOn.org petitions. The petition contained 58 signatures at the close of the comment period. NMFS has responded to the petition below.

Comments specific to section 101(a)(5)(A) of the MMPA and NMFS' analysis of impacts to marine mammals are summarized, sorted into general topic areas, and addressed below and/or throughout the final rule. Comments specific to the GOA FSEIS/OEIS, which NMFS participated in developing as a cooperating agency and adopted, or that were also submitted to the Navy during the GOA DSEIS/OEIS public comment period are addressed in Appendix D (Public Participation) of the GOA FSEIS/OEIS. Some commenters presented technical comments on the general behavioral risk function that are largely identical to those posed during the comment period for proposed rules for the Atlantic Fleet Training and Testing (AFTT), Hawaii-Southern California Training and Testing (HSTT),

Mariana Islands Training and Testing (MITT), and NWT study areas—Phase II predecessors to the GOA TMAA rule. The behavioral risk function remains unchanged since then, and here we incorporate our responses to those initial technical comments (78 FR 73010, 73038 (December 3, 2013), Acoustic Thresholds; 78 FR 78106, 78129 (December 24, 2013), Acoustic Thresholds; 80 FR 46112, 46146 (August 3, 2015), Criteria and Thresholds; 80 FR 73556, 73579 (November 24, 2015)). Full copies of the comment letters may be accessed at <http://www.regulations.gov>.

General Opposition

Comment 1: The vast majority of comments received by NMFS were from commenters expressing general opposition to Navy training activities in the GOA TMAA and NMFS' issuance of an MMPA authorization. Many commenters claimed that the Navy's activities would result in the “killing,” “blowing up,” or “deaths” of marine mammals during GOA training activities using sonar.

Response: NMFS appreciates the commenters' concern for the marine environment. However, the commenters' assertion that the Navy's activities in the GOA TMAA Study Area will result in the killing or deaths of marine mammals is incorrect. As discussed throughout this rule and in the GOA FSEIS/OEIS, the vast majority of predicted takes are by Level B harassment (behavioral reactions and TTS), and there are no mortality takes predicted or authorized for any training activities in the Study area. Further, any impacts from the Navy's activities are expected to be short term and would not result in significant changes in behavior, growth, survival, annual reproductive success, lifetime reproductive success (fitness), or species recruitment. The Navy has conducted active sonar training activities in the Study Area for years, and there is no evidence that routine Navy training and testing has negatively impacted marine mammal populations in the Study Area or at any Navy Range Complex. As described in more detail later in this document, based on the best available science, NMFS has determined that the Navy's training activities will have a negligible impact on the affected species or stocks and, therefore, we plan to issue the requested MMPA authorization.

Comment 2: An online petition, titled “Stop Sonar and Underwater Explosions in Gulf of Alaska,” was created by Eye of the Whale Research and circulated via MoveOn.org petitions. The petition is for NMFS' denial of the Navy's LOA

application based on sonar and explosives use that could potentially hurt marine mammals in Alaska waters.

Response: The Navy and NMFS are aware that even with implemented mitigations, Navy training in the GOA TMAA Study Area will result in behavioral impacts to a number of marine mammals of multiple species and injurious impacts to a small number of Dall's porpoises, which is precisely why those predicted effects are quantified and have been requested pursuant to the MMPA and ESA. Section 101(a)(5)(A) of the MMPA directs the Secretary of Commerce to allow, upon request, the incidental taking of small numbers of marine mammals if certain findings are made and regulations are issued. NMFS has made the requisite findings and therefore must issue regulations and an LOA for the Navy's activities.

Activity

Comment 3: Several commenters pointed out the importance of salmonid and other fisheries resources in Alaska and expressed concerns with Navy training impacts to commercial, recreational, and subsistence fishing in the Study Area.

Response: Regarding impacts to salmon, fish in general, and the commercial fishers, as presented in Section 3.6 (Fish) and Section 3.12 (Socioeconomics) of the 2011 GOA FSEIS/OEIS and the GOA FSEIS/OEIS, NMFS and the Navy are aware of the importance of fisheries in Alaska. The proposed training activities are predicted to have no impact on fish populations, the health of fisheries, or socioeconomic conditions in Alaska.

Regarding concerns over subsistence resources, the proposed action is the continuation of the types of training activities that have been ongoing for more than a decade. No impacts to traditional subsistence practices or resources are predicted to result from the proposed activities. Further, after consultations with Alaska Native tribes from the Kodiak and Kenai Peninsula region, the Navy has confirmed that training events in the TMAA would not involve the use of any explosives in one particular and well-defined fishing area known as Portlock Bank.

Also note that as described in the 2011 GOA FSEIS/OEIS, sonar use is unlikely to disturb fish since most fish cannot hear sonar at the frequencies in the proposed action and science indicates that the few fish that can hear in those frequencies have no significant, if any, reaction to sonar. Please also see the GOA FSEIS/OEIS Section 3.8.5 (Summary of Observations During

Previous Navy Activities), where over eight years of monitoring effort has found no evidence that Navy training activities have had any impact on fish populations in the Pacific in areas such as Southern California or Hawaii where Navy training has been occurring year-round for decades.

Additionally, the effects on marine mammal prey species were addressed in the proposed rule and deemed not to be significant and, further, NMFS' biological opinion analyzing the Navy's activities found that they were not likely to jeopardize any listed fish species or destroy or adversely modify any designated critical habitat for ESA-listed fish.

Comment 4: Some commenters expressed concern with potential Navy training impacts to endangered or threatened species within the Study Area.

Response: As discussed in the proposed rule, there are eight marine mammal species under NMFS' jurisdiction that are listed as endangered or threatened under the ESA with confirmed or possible occurrence in the Study Area: Blue whale, fin whale, humpback whale (Mexico DPS and Western North Pacific DPS), sei whale, sperm whale, gray whale (Western North Pacific stock), North Pacific right whale, and Steller sea lion (Western U.S. stock). Pursuant to the MMPA, NMFS found that the take authorized for the Navy's training activities in the GOA TMAA would have a negligible impact on these ESA-listed species. Further, the Navy consulted with NMFS pursuant to section 7 of the ESA, and NMFS also consulted internally on the issuance of a rule and LOA under section 101(a)(5)(A) of the MMPA for GOA activities. NMFS issued a Biological Opinion concluding that the issuance of the rule and subsequent LOA are likely to adversely affect, but are not likely to jeopardize, the continued existence of the threatened and endangered species under NMFS' jurisdiction and are not likely to result in the destruction or adverse modification of critical habitat in the GOA TMAA Study Area. The Biological Opinion for this action is available on NMFS' Web site (<http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>).

Additionally, we note here that since the publication of the proposed rule, the Navy chose to reduce the proposed amount of activity significantly, lessening the number of the Carrier Strike Group Events from two to one per year, and the number of SINKEXs from two to zero per year. This significantly decreases (by about half) the number of

anticipated and authorized takes for this activity.

Comment 5: Several commenters requested that the Navy change the timing of operations from summer (April to October) to winter (November to March), in order to minimize effects on migratory whales and fisheries in the area in summer.

Response: Comments that suggest restricting or scheduling the training so it will occur in the winter provide as partial rationale that the mitigation is needed to avoid whales that migrate to Alaska. Navy training is proposed to occur between April to October for the safety of the exercise participants and due to the severe conditions in the winter months. Due to the high sea states and cloud cover in the TMAA during winter months, training in the TMAA has historically occurred in the summer (June–July). These factors were a consideration in the Alternatives Development of the 2011 GOA FEIS/OEIS (Chapter 2, Section 2.3). As detailed in Section 3.8 (Marine Mammals) of the GOA FSEIS/OEIS, there are marine mammals present year-round in the Gulf of Alaska (*e.g.*, humpback whales, blue whales, fin whales, gray whales, and pinnipeds). Additionally, the majority of the migratory species and many of the species feeding in the area in the summer (*e.g.*, fin whale, humpback whales, gray whales) are typically found in high numbers much closer to shore than in the waters that constitute the majority of the TMAA (see Ferguson *et al.*, 2015; Rone *et al.*, 2014; Witteveen, 2014). Generally, Navy training activities are not likely to affect animals in nearshore locations given that the TMAA boundary nearest to land is approximately 25 nm from the Kenai Peninsula and the center of the TMAA is approximately 140 nm offshore. Any effects to whales in Alaska from Navy training are most likely to result from acoustic sources associated with events occurring in the deep water areas and away from the edges of the TMAA boundary. It is also important to note that the available scientific information does not provide evidence that exposure to acoustic stressors from Navy training activities are likely to impact the fitness of individual whales and are not likely to result in adverse population level or species level impacts. For the reasons outlined above, training in the winter would not be expected to meaningfully reduce impacts to marine mammal species or stocks and their habitat, while it would be impracticable and would unnecessarily increase risk and threaten the safety of Navy personnel engaged in training.

Comments suggesting not holding the training activities during the summer period have also been predicated on avoiding impacts to fisheries during the fishing season and the livelihood of fishermen and fishing communities. As detailed in Section 3.6 (Fish) of the GOA FSEIS/OEIS, based on the best available science, the continuation of training in the GOA TMAA would not have an impact on populations of fish, the health of the fisheries, or the ability of fishermen to fish. It is also important to note that training has been conducted for many years in the GOA TMAA and there have been no reported impacts to any fish populations or fishery activities. Therefore, training in the winter would not be practicable and would not be effective in avoiding impacts to fish or fisheries but would unnecessarily increase risk and threaten the safety of the Navy personnel engaged in training.

NMFS is charged with promulgating regulations and issuing LOAs for the requested activity, provided we find that the authorized take will have a negligible impact on the effected marine mammal species or stock and that we ensure that measures are required that ensure the least practicable adverse impact on the species or stocks and their habitat—which we have. The specific activity that the Navy requested was to conduct these activities for 21 days (initially two times, now lowered to one time) between the months of April and October—requiring them to conduct the exercise outside of these dates is not mitigation within the context of the requested action, but rather asking them to change their requested activity.

Comment 6: NRDC *et al.* commented that NMFS' proposed rule "green-lights dangerous levels of harm, including population-level harm, to marine mammals in the face of both increased scientific certainty related to the sensitivity of marine mammals to Navy sonar and increased scientific concern regarding the population-level, long-term, and ecosystem effects of Navy sonar on marine mammal species."

NRDC *et al.* also comment that Navy training activities would subject relatively naïve marine mammal species to sonar and explosives effects. Beaked whales are provided as an example of species that may be particularly at risk, and NRDC *et al.* references well-documented beaked whale stranding events in their assertion that beaked whales may be particularly vulnerable to the effects of active sonar. NRDC *et al.* and other commenters also expressed concern with the potential for overlap between Navy activities within the GOA

TMAA and important feeding areas for endangered North Pacific right whale and migratory and feeding areas for gray whale.

Response: The Navy has been conducting largely the same training activities using the same type of equipment in the GOA TMAA Study Area for over a decade, and has been authorized to use sonar in training events in the Study Area since 2011, without any evidence of harm to marine species as a result of those activities. The activities will occur over the course of no more than 21 days per year. No mortality is anticipated or authorized and only a small number (4) of level A Harassment takes (PTS) are authorized for one species (Dall's porpoise). As described in the GOA FSEIS/OEIS and this final rule, the overwhelming majority of takes predicted for all species are expected to be short-term behavioral responses to relatively short-term activities (Level B harassment). The takes authorized by this rule are less than (*i.e.*, reduced by half with Alternative 1) what was previously authorized for the same training activities that have been occurring for years in the Study Area, and are far less than what is authorized in other Navy training and testing areas (*e.g.*, AFTT, HSTT, NWTT). In particular, see Section 3.8.5 (Summary of Observations During Previous Navy Activities) of the GOA FSEIS/OEIS and the "Long Term Consequences" section of this rule regarding the likely long-term consequences from those activities.

NMFS notes that legislative history suggests that Congress intended that Level B harassment be limited to behavioral disturbances that have "demographic consequences to reproduction or survivability of the species." H.R. Conf. Rep. 108-354 (2003), 108th Cong., 1st Sess., *reprinted in* 2004 U.S.C.C.A.N. 1407, 1447. However, no methodology currently exists that would allow the Navy to estimate each type of potential response to sonar, predict any long-term consequences for the affected mammals, and limit its take request to only the most severe responses that would have demographic consequences to reproduction or survivability of the species. Therefore, as described in the "Analysis and Negligible Impact Determination" section of this rule, the Navy's take estimates capture a wider range of less significant effects. NMFS considers the available scientific evidence to determine the likely nature of the modeled behavioral responses and the potential fitness consequences for affected individuals in evaluating whether the proposed activities will

have a negligible impact on the affected marine mammal species or stocks. As analyzed in the "Analysis and Negligible Impact Determination" section of this final rule, the majority of the authorized Level B harassment takes are expected to be in the form of milder responses (*i.e.*, lower-level exposures that still rise to the level of take, but would be less severe in the ranges of responses that qualify as a take), and are not expected to have deleterious impacts on the fitness of any individuals or long-term consequences to populations of marine mammals.

Effects on marine mammals will be minimized through the Navy's implementation of the following mitigation measures (among others): (1) The use of lookouts to monitor for marine mammals and begin powerdown and shutdown of sonar when marine mammals are detected within ranges where the received sound level is likely to result in PTS or other injury; (2) the use of mitigation zones that avoid exposing marine mammals to levels of explosives likely to result in injury or death of marine mammals; (3) vessel maneuvering protocols; and (4) operational restrictions in a North Pacific right whale Cautionary Area. NMFS and the Navy have also worked to develop a robust monitoring plan to improve our understanding of the environmental effects resulting from the use of active sonar and underwater explosives. Additionally, the final rule includes an adaptive management component that allows for timely modification of mitigation or monitoring measures based on new information, when appropriate.

Given the number of commercial and private vessels using sonar for fishing, navigation, and research in the Gulf of Alaska and the Navy's authorized use of sonar in training events since 2011, it is unlikely that there are "marine mammal populations in the Gulf of Alaska that are naïve to an acoustic stressor," especially in the Navy's historically used GOA TMAA.

The facts regarding the beaked whales found stranded in 2004 were presented in the 2011 GOA FEIS/OEIS and are also presented in the referenced technical report accompanying the FSEIS/OEIS. In 2004, between June 27 and July 19, five beaked whales were discovered stranded at various locations along 1,600 mi (2,625 km) of the Alaskan coastline and one was found floating (dead) at sea. Sonar training events had not been part of an exercise which took place in that general timeframe in the TMAA and there are no Navy vessels stationed in Alaska or otherwise using those waters for training purposes.

Beaked whale strandings do occur routinely in Alaska waters and NMFS did not consider these strandings unusual or otherwise declare them to be a UME.

Regarding the presence of North Pacific right whale and gray whale and associated biologically important habitat adjacent to, and within, the GOA TMAA, please refer to the "Consideration of Time/Area Limitations" section of this rule for a complete discussion and evaluation of the spatio-temporal overlap of Navy activities and important feeding and migratory areas for these species. NMFS' consideration of additional mitigation (time/area closures) in these areas is also discussed in that section, and later in the "Response to Comments" section. To summarize, NMFS is requiring a North Pacific right whale "Cautionary Area" between June and September in the overlapping 2,051 km² portion of the North Pacific right whale feeding area, in which no hull-mounted sonar or explosives would be used within the portion of the feeding area that overlaps the Navy's GOA TMAA during those months, except when required by national security needs. In the event of national security needs, the Navy would be required to seek approval in advance from the Commander, U.S. Third Fleet prior to conducting training activities using sonar or explosives. NMFS believes that implementation of this North Pacific Right Whale Cautionary Area within the GOA TMAA may provide additional protection of this species and stock beyond the mitigation measures already proposed by the Navy. In the case of the gray whale migratory area, given the extremely minimal geographic and temporal overlap with Navy training activities in the GOA TMAA, coupled with the fact that no takes of gray whale are predicted to occur with the proposed level of training effort, NMFS has determined that additional mitigation measures related to time/area limitations of Navy training activities within the overlapping portion of the migratory area would not contribute to any lessening of the likelihood of adverse impacts on the species or stocks or their habitat, and are therefore not warranted in the context of the least practicable impact standard.

Marine Mammal Density Estimates

Comment 7: The Commission recommended that if the Navy requests authorization to conduct training activities from April to October, then it include the appropriate environmental parameters in its acoustic modeling based on those months rather than

assuming the activities would occur only during July.

Response: The factor having the most effect on the modeling is marine mammal density. Detailed information on the Navy's selection protocol, datasets, and specific density values, is presented in Section 3.8.2.5 (Marine Mammal Density Estimates) in the GOA FSEIS/OEIS and the Pacific Navy Marine Species Density Database GOA Technical Report (U.S. Department of the Navy, 2014). In some cases, use of multiple surveys may provide the best density estimates. For example, data from Rone *et al.* (2009), consisting of an April 2009 marine mammal survey conducted by NMFS in the Study Area, was one data source. Another NMFS survey was conducted from June to July 2013 (Rone *et al.*, 2014) and was also incorporated. Data from both surveys were used to derive marine mammal densities and vetted through NMFS subject matter experts. As noted in the Technical Report, density estimates used in the modeling were more heavily influenced by the 2013 survey, where greater effort was conducted over a better representative stratified area (Rone *et al.*, 2014). More sightings of more species were obtained in the June–July 2013 survey versus the April 2009 survey. NMFS or other academic agencies have not done extensive surveys within the Study Area at other times of the year and monthly or sub-season sighting data are not available for the entire suite of marine mammal species potentially present. The data provided for GOA modeling are the best available density estimates and sufficiently representative for the summer period.

Because the proposed training (Northern Edge) has historically occurred in the May to July timeframe, the proposed training in the GOA TMAA is different from other Navy range complexes such as the Northwest Training and Testing Range Complex, where there is year-round unit level training. Therefore, a seasonal analysis is called for in modeling activities in the GOA TMAA; modeling for GOA was not done for year-round continuous activity because the Navy's training activities do not occur year-round in the GOA TMAA. To provide for future flexibility if needed, the GOA FSEIS/OEIS indicated that the proposed activities could occur during the summer months (April–October); however, they are most likely to occur in the May–July timeframe. Overall, any monthly differences in marine mammal densities from July to October is likely to be very similar to the July data used for density derivation in the GOA analysis. Five

years (2011–2015) of year-round Navy funded passive acoustic monitoring in GOA found higher likelihood for more species, including ESA listed marine mammals, in mid-summer to late summer (July–October) as compared to early summer (May–June). Therefore, the current density estimates used for the GOA FSEIS/OEIS are equivalent for species abundance in the July to October timeframe, and likely over predictive for the more probably time in which an actual Northern Edge exercise would be expected to occur (May–July).

The use of these densities is scientifically valid, representative of expected densities for all species over the proposed date range, and based on the best available science. Monthly seasonal densities are not available for the Study Area, and even if they were, they would not likely change any of the conclusions in the FSEIS/OEIS or this final rule.

Comment 8: The Commission stated that it was unsure how the Navy determined that extrapolated densities better represent expected densities than densities from relevant environmental suitability (RES) models in the absence of density data. The Commission recommended 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 percent confidence interval or the arithmetic mean plus two standard deviations and (2) then re-estimate the numbers of takes accordingly.

Response: The Navy coordinated with scientists at the Northwest Fisheries Science Center (NWFS) and the National Marine Mammal Laboratory (NMML) to help identify the best available density estimates for marine mammals occurring in the Study Area. As the commenter points out, there is uncertainty in estimating marine mammal densities, and for some species very little data are available. See the previous comment response for an explanation of why the density data collected in July (Rone *et al.*, 2014) is scientifically valid, representative of expected densities for all species over the proposed date range, and based on the best available science.

Using the mean value to estimate densities is a reasonable and scientifically acceptable approach. While the mean may underestimate a species' density, by definition, it is equally probable that it could overestimate a species' density. The mean density estimate is the best value to use as input into the Navy's acoustic effects model to minimize the influence of uncertainty inherent in the science. Also, the future application of this

survey data as representative for year-round densities has no bearing on the GOA FSEIS/OEIS, because the proposed action does not occur year-round. Furthermore, the use of the mean density estimate is consistent with the approach taken by NMFS to estimate and report the populations of marine mammals in NMFS' Stock Assessment Reports. For these reasons, the mean density estimate is thus considered the "best available data."

Using the upper limit of the 95 percent confidence interval or adjusting the mean estimates as suggested would result in unreasonable and unrealistic estimates of species densities, particularly given the very high coefficients of variation (CVs) associated with most marine mammal density estimates. A confidence interval is only meant to be an indication of the uncertainty associated with a point estimate, and should not be used to derive any absolute number within the confidence interval. Using the upper limit of the range as an input would do nothing to decrease the level of uncertainty. Implementing the recommendation would result in an unrepresentative overestimate of the expected effects (takes) from the proposed action. Further, as detailed in Section 3.8.3.1.6.3 (Navy Acoustic Effects Model) of the GOA FSEIS/OEIS, the Navy's acoustic model already includes conservative assumptions (*e.g.*, assumes that the animals do not move horizontally, assumes they are always head-on to the sound source so that they receive the maximum amount of energy, etc.), resulting in a more conservative (*i.e.*, greater) assessment of potential impacts.

Comment 9: The Commission commented that the Rone *et al.* (2014) data used by the Navy to estimate densities of northern fur seals likely under-represent densities for the summer timeframe in which training activities are likely to occur. The Commission believes that the densities would be underestimated even if the Navy incorporated the CVs from the Rone *et al.* (2014) data.

Response: The Navy consulted with scientists from the NWFS and NMML to help identify the best available density estimates for marine mammals occurring in the Study Area. The timeframe for when the activities have historically occurred, and for when they would be expected to occur predominantly over the course of the rule, are well represented by the June to July timeframe. Data collected from Rone *et al.* (2014) in the summer of 2014 resulting in 69 on-effort northern fur seal sightings (74 individuals) in the

Study Area is representative of the presence of northern fur seals in the Study Area. The Rone *et al.* (2014) survey occurred in approximately the same month when previous Navy training events have occurred and are most likely to occur in the future. The Rone *et al.* (2014) data is therefore the most representative for use in the assessment of impacts. As noted in the GOA FSEIS/OEIS, tagging data presented by Ream *et al.* (2005) indicate the main foraging areas and the main migration route through the Gulf of Alaska are located far to the west of the Study Area, so the movement of animals involving the larger expanse of the Gulf of Alaska at other times of the year and outside the Study Area are not relevant.

Further, we note that although modeled take estimates are our best attempt at quantifying the impacts of the proposed action, they do not represent the entirety of our analysis. For the Gulf of Alaska specifically, we have described elsewhere the context and nature of the anticipated impacts on marine mammals, which are expected to be of short duration and a comparatively small degree—meaning that a small number of additional Level B harassment takes would not be expected to change our assessment of the effects on the population.

Comment 10: The Commission recommended that NMFS require the Navy to (1) revise its Steller sea lion abundance estimate to include updated abundance data from Allen and Angliss (2015) (the Navy used abundance data from Allen and Angliss (2009) to estimate Steller sea lion densities) and consult with scientists at NMML regarding unpublished data to revise its Steller sea lion densities, and (2) revise its northern elephant seal abundance estimate to include both updated abundance data from Allen and Angliss (2015) and data for female elephant seals and incorporate data from Robinson *et al.* (2012) into its estimates of northern elephant seal densities.

Response: We note, first, that Allen and Angliss (2015) was published approximately a year after GOA densities were derived and modeled for the GOA SEIS/OEIS. Prior to that, the Navy coordinated with scientists at NMML to help identify the best available density estimates for marine mammals occurring in the Study Area at the beginning of the density derivation process. For Steller sea lions, rookeries on both sides of the 144 °W longitude line dividing the two stocks (DPSs) were used in the estimate of density, with Allen and Angliss (2009) and associated references consulted. The abundance increase in the Stock Assessment Report

(Allen and Angliss, 2015) is a trend characterizing the 12-year period between 2000 and 2012. The most recent Alaska Stock Assessment Report (Muto *et al.*, 2016, which cites Johnson and Fritz 2014, Fritz *et al.*, 2015) continued the trend analysis to 2014. While Muto *et al.* (2016) and associated references allude to a small percent increase in some regional Steller sea lion abundances after the date range used by the Navy for GOA densities, the increases are relatively small and also subject to variation by region. Furthermore, given the way modeling occurs in NAEMO, slight increases to density for a species do not always lead to corresponding linear increase in modeled takes because there are other statistical factors of the model as well (see Navy's Acoustic Effects 2015 Technical Report).

As currently modeled, the estimated takes of the two DPSs of Steller sea lions are relatively small compared to estimated takes for other species under Alternative 1 (*i.e.*, a total of 621 takes for the two Steller sea lion DPSs). The potential addition of a small number of additional Level B harassment takes based on small density changes would not be significant. Modeled take estimates are our best attempt at quantifying the impacts of the proposed action, but they do not represent the entirety of our analysis. For the Gulf of Alaska specifically, we have described elsewhere the context and nature of the anticipated impacts on marine mammals, which are expected to be of short duration and a comparatively small degree—meaning that a small number of additional Level B harassment takes would not be expected to change our assessment of the effects on the population.

For elephant seals, the text presented in the GOA FSEIS/OEIS does not indicate absolute geographic presence or absence of elephant seals, but is presented as a generalization based on findings presented in the three references cited (Le Boeuf *et al.*, 2000; Stewart and DeLong, 1995; and Stewart and Huber, 1993). Tag data from Robinson *et al.* (2012) was considered in the analysis and clearly shows that the females mostly range east to about 173 °W, between the latitudes of 40 °N and 45 °N, consistent with the presentation in the GOA FSEIS/OEIS. The kernel density distribution presented by Robinson *et al.* (2012) confirms most of the tagged elephant seals foraged outside of the Study Area. Furthermore, Robinson *et al.* (2012) provides density only in relative terms of high or low, and not with the statistical calculations needed to derive exact at-sea densities

as required by NMFS. By and large, the presence of elephant seals in the Study Area would likely be limited and transitory. The derived density of elephant seals in the Study Area as explained in the Navy's density technical report therefore remains a conservative over-estimate for purposes of acoustic effect modeling.

Criteria and Thresholds

Comment 11: The Commission recommended that NMFS require the Navy to update Finneran and Jenkins (2012) to include the appropriate justification for its use of the 6-dB extrapolation factor between explosive and acoustic sources; use 151 dB rather than 152 dB re 1 μ Pa \cdot sec as the TTS threshold for high-frequency cetaceans exposed to acoustic sources; use 145 dB rather than 146 dB re 1 μ Pa \cdot sec as the TTS threshold for high-frequency cetaceans for explosive sources; and based on these changes to the TTS thresholds, adjust the PTS thresholds for high-frequency cetaceans by increasing the amended TTS threshold by 20 dB for acoustic sources and 15 dB for explosive sources, and adjust the behavioral thresholds by decreasing the amended TTS thresholds by 5 dB for explosive sources.

Response: NMFS participated in the development of the acoustic thresholds used in the FSEIS/OEIS. As detailed in Finneran and Jenkins (2012), the thresholds presented in the FSEIS/OEIS incorporate new findings since the publication of Southall *et al.* (2007) and the evolution of scientific understanding since that time. Dr. Finneran was one of the authors for Southall *et al.* (2007) and, as such, is familiar with the older conclusions present in the 2007 publication and therefore was able to integrate that knowledge into the development of the refined approach that was presented in Finneran and Jenkins (2012) and based on evolving science since 2007. Details regarding the process are provided in Section 3.8.3.1.6 (Quantitative Analysis) of the GOA FSEIS/OEIS. Also, see the summary of the thresholds used in the analysis as presented in Section 3.8.3.1.4 (Thresholds and Criteria for Predicting Acoustic and Explosive Impacts on Marine Mammals).

Briefly, the original experimental data is weighted using the prescribed weighting function to determine the numerical threshold value. The Commission did not consider the appropriate weighting schemes when comparing thresholds presented in Southall *et al.* (2007) and those presented in Finneran and Jenkins (2012). TTS thresholds presented in

Finneran and Jenkins (2012) are appropriate when the applicable weighting function (Type II) is applied to the original TTS data; TTS thresholds in Southall *et al.* (2007) were based on M-weighting. For example, while it is true that there is an unweighted 12-dB difference for onset-TTS between beluga watergun (Finneran *et al.*, 2002) and tonal exposures (Schlundt *et al.*, 2000), the difference after weighting with the Type II MF-cet weighting function (from Finneran and Jenkins, 2012) is 6 dB. The Commission has confused (a) the 6 dB difference in PTS and TTS thresholds based on peak pressure described in Southall *et al.*, 2007 with (b) the difference between impulsive and non-impulsive thresholds in Finneran and Jenkins (2012), which is coincidentally 6 dB. In summary, the values derived for impulsive and non-impulsive TTS and for determining PTS and impulsive behavior thresholds from TTS thresholds are correct based on the data presented.

More importantly, the Navy and NMFS have continued to revise acoustic thresholds based on emergent research. In August 2016, NOAA released its *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing*, which established new thresholds for predicting auditory injury (*i.e.*, PTS). In developing the new Guidance, NMFS compiled, interpreted, and synthesized scientific information currently available on the effects of anthropogenic sound on marine mammals, including a recent Technical Report by Dr. James Finneran (U.S. Navy-SPAWAR Systems Center Pacific) that proposed new weighting functions and thresholds for predicting the onset of both PTS and TTS in marine mammals (Finneran, 2016). The methodologies presented within this paper build upon the methodologies used to develop the criteria applied within the proposed rule and Navy's GOA FSEIS/OEIS (Finneran and Jenkins, 2012), and incorporate relevant auditory research made available since 2012 (*e.g.*, Kastelein *et al.*, 2012a; Kastelein *et al.*, 2012b; Finneran and Schlundt, 2013; Kastelein *et al.*, 2013a; Kastelein *et al.*, 2013b; Popov *et al.*, 2013; Kastelein *et al.*, 2014a; Kastelein *et al.*, 2014b; Popov *et al.*, 2014; Finneran *et al.*, 2015; Kastelein *et al.*, 2015a; Kastelein *et al.*, 2015b; Popov *et al.*, 2015). In light of limited data at the time, Finneran and Jenkins (2012) presented a conservative approach to development of auditory weighting functions. In 2016, with the benefit of newly-available data, Finneran was able to synthesize a wide

range of auditory data, including newly-available studies, to predict refined auditory weighting functions and corresponding TTS thresholds across the complete hearing ranges of functional hearing groups.

The specific recommendations made by the Commission in its comments on the proposed rule were overcome by events when Finneran (2016) was published and adopted by NMFS in its new Guidance. All the methods used for synthesizing and interpreting new data sets into thresholds data were shared with the public and all comments were addressed prior to finalizing the Guidance. NMFS' new Guidance uses 153 dB for TTS for HF species from non-impulsive sources (1 dB less conservative than Finneran (2012) and 2 dB less conservative than the Commission recommended) and uses 140 dB for TTS for HF species from impulsive sources (6 dB more conservative than Finneran (2012) and 5 dB more conservative than the Commission recommends). Further, as recommended, 20 dB was added to the TTS value to get the PTS value for the non-impulsive sources, and 15 dB was added for the explosive source threshold.

At the time of the release of the proposed rule and GOA FSEIS/OEIS, NMFS' final Guidance had not been issued. Further, the new criteria were not available for the Navy's acoustic effects modeling used to calculate distances to harassment thresholds and resulting take estimates. Therefore, the Navy did not use the new auditory weighting functions and PTS/TTS criteria in its GOA FSEIS/OEIS. However, the underlying science contained within Finneran (2016) has been addressed qualitatively within the applicable sections of the GOA FSEIS/OEIS and this final rulemaking. Further, although the writers of the base code for the model used for Phase II were not available to recode the model with the updated impulsive criteria in terms of weighting functions, the Navy was able to use the model to reprocess anticipated explosive ranges to effects for PTS based on the criteria presented in the new Guidance, from which TTS and behavioral exposures could be estimated, to assess if the new criteria could result in any additional species-specific injury exposures. For more information on this analysis, see the "Summary of Request" section in this final rule.

Comment 12: NRDC *et al.* commented that the Navy and NMFS failed to set proper thresholds for threshold shift and injury. They assert the following as reasons, referencing several articles, for

their belief that the thresholds are improper: First, NMFS' direct extrapolation of data from bottlenose dolphins and belugas to low-frequency cetaceans is not justifiable and insufficiently conservative. Second, NMFS makes no attempt to account for the potential bias in Space and Naval Warfare Systems Command's (SPAWAR) bottlenose dolphin data, particularly the age of the subjects used in these influential studies and their situation for years within a noisy bay. Third, NMFS' weighting curve for high-frequency cetaceans is not sufficiently conservative in light of ongoing studies, as by Ron Kastelein. Fourth, NMFS' analysis fails to incorporate empirical data on both humans and marine mammals indicating that PTS can occur at levels previously thought to cause temporary threshold shift only.

Response: NMFS disagrees. The criteria and thresholds for determining potential effects on marine species used in the GOA FSEIS/OEIS, the LOA application, and the proposed rule were developed based on best available science. See the cited Finneran and Jenkins (2012; Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis Technical Report), which can be found at <http://www.goaeis.com>. Moreover, as described previously, the thresholds outlined in Finneran and Jenkins (2012) (and used in the GOA FSEIS/OEIS) were updated with new data in Finneran (2016), which was adopted by NMFS for use in its new Guidance, following an opportunity for public comment in which NMFS addressed all comments on data and methods (including points that are raised here, such as the reference to Wright (2015)).

As described in the "Summary of Request" section of this rule, NMFS and the Navy assessed the training activities in the GOA TMAA in the context of the new Guidance and all of the associated new data that support it (see previous comment response) and made changes to the take estimates where appropriate. As described, although most thresholds changed a little in one direction or the other (including going down for LF and HF species by 4 and 6 dB, respectively, for explosives), and the weighting functions for all taxa changed, when considered together and in the context of the proposed activities, the changes in the take estimates were relatively small (increasing takes only for Dall's porpoise, by 3 Level A and 149 Level B harassments). In short, much of this comment has been overcome by events, but nonetheless, we address some of the details below. Although the commenter is not specifically commenting on it

here, we note that some similar issues were raised in the context of the new 2016 Acoustic Guidance, and NMFS responded to those concerns in our **Federal Register** notice announcing the finalization of the Guidance (81 FR 51693; August 4, 2016; <https://www.federalregister.gov/documents/2016/08/04/2016-18462/technical-guidance-for-assessing-the-effects-of-anthropogenic-sound-on-marine-mammal>).

Regarding the commenters' first point, NMFS disagrees that the thresholds are unjustified and insufficiently conservative. The discussion presented in the GOA FSEIS/OEIS Section 3.8.2.3.3 (Low-Frequency Cetaceans) and Section 3.8.3.1.11 (Frequency Weighting) describes the derivation of the thresholds and criteria for low frequency cetaceans that were used in take calculations in the proposed rule. Specifically, it was the low- and high-frequency cetacean weighting functions (see Southall *et al.*, 2007) that were extrapolated from the dolphin data because of the suspected similarities of greatest susceptibility at best frequencies of hearing consistent with the best available science. The Navy used experimentally derived mid-frequency cetacean thresholds to assess PTS and TTS for low-frequency cetaceans, since mid-frequency cetaceans are the most similar to the low frequency group (see Southall *et al.*, 2007; Finneran and Jenkins, 2012). Although the mid-frequency criteria and thresholds are applied to low frequency cetaceans, exposures and threshold sound exposure levels are weighted using the low frequency cetacean weighting function rather than the mid-frequency, which provides higher susceptibility to low frequency sound, consistent with their inferred frequencies of best hearing. Data for low frequency cetaceans considered in the analysis also includes that from Ketten (2014) for blue whales and minke whales, Ketten and Mountain (2014) for humpback whales, and Cranford and Krysl (2015) for fin whales. Observed vocalization frequencies, observed reactions to playback of sounds, anatomical analyses of the auditory system (Cranford and Krysl, 2015; Houser *et al.*, 2001; Ketten, 2014; Ketten and Mountain, 2014; Parks *et al.*, 2007), and a general understanding of mammalian hearing are the reasons and science behind why the methodology in the GOA FSEIS/OEIS and the proposed rule is justifiable. NMFS disagrees that the approach was not conservative given that low frequency cetaceans do not echolocate and that the physiology of

mysticetes indicates a lack of sensitivity to high frequency sound.

NMFS disagrees with the commenters' second point, as the data used in the Navy's and NMFS' analyses included many animals and species at multiple experimental facilities around the world as well as auditory measurements on wild animals that had stranded, in addition to anatomical analyses of the auditory system of mysticetes (Cranford and Krysl, 2015; Houser *et al.*, 2001; Ketten, 2014; Ketten and Mountain, 2014; Parks *et al.*, 2007). Direct measurement of hearing sensitivity exists for approximately 25 species of marine mammals, including the following cetacean species: Atlantic white-sided dolphins (Houser *et al.*, 2010a), common dolphins (Houser, Dankiewicz-Talmdage *et al.*, 2010), Atlantic bottlenose dolphins (Johnson, 1967), Indo-Pacific bottlenose dolphins (Houser *et al.*, 2010a), Black Sea bottlenose dolphins (Popov *et al.*, 2007), striped dolphins (Kastelein *et al.*, 2003), white-beaked dolphins (Nachtigall *et al.*, 2008), Risso's dolphins (Nachtigall *et al.*, 2005), belugas (Finneran *et al.*, 2005; White *et al.*, 1977), long-finned pilot whales (Pacini *et al.*, 2010), false killer whales (Yuen *et al.*, 2005), killer whales (Szymanski *et al.*, 1999), Gervais' beaked whales (Finneran *et al.*, 2009), and Blainville's beaked whales (Pacini *et al.*, 2011).

Regarding the commenters' third point, the most recent publications by Dr. Kastelein are cited and were considered in the analysis presented in the GOA FSEIS/OEIS (see Kastelein *et al.*, 2014a, 2014b, 2015). In reference to the most recent publication involving non-pulse sources (sonar) from Kastelein *et al.* (2015), the authors found that the threshold shift criteria proposed by Southall *et al.* (2007) for cetaceans echolocating at high frequency (SEL 215 dB re 1 lPa2s) was too high for the harbor porpoise when considering high duty cycle sonars. Kastelein *et al.* (2015) documented fatiguing sounds at duty cycles of 10 percent (one sonar ping every 10 seconds) and 100 percent (one ping immediately followed by another). The high duty cycle sonar used in Kastelein's study were a different frequency (6–7 kHz) and produce sound at a higher rate than the Navy's hull-mounted mid-frequency anti-submarine sonar, which nominally produces one ping every 45 seconds. Therefore, the Kastelein (2015) study and its findings do not relate to the Navy's proposed action or the sonar sources proposed for use in the GOA TMAA Study Area.

Additionally, TTS represents a physiological metric for a behavioral reaction and an exposure resulting in

TTS has been and is considered an MMPA Level B harassment take. As presented in Section 3.8.3.1.5 (Sonar and Other Active Acoustic Sources, Subsection *Harbor Porpoises*) of the GOA FSEIS/OEIS, the Navy and NMFS are aware of the sensitivity of harbor porpoises and have established a sound pressure level of 120 dB re 1 μ Pa as a threshold for predicting behavioral responses in harbor porpoises and Level B harassment takes pursuant to the MMPA.

The reference to Tougaard *et al.* (2014) cited by the commenters has been considered in the GOA FSEIS/OEIS. The point raised in that reference was that the Southall *et al.* (2007) weighting functions need updating given there have been new studies that have since become available. The Navy's analysis is in fact based on an update to Southall *et al.* (2007) as detailed in Finneran and Jenkins (2012). In the opinion of the authors, the net result from revisions to the weighting functions like that used by the Navy (Finneran and Jenkins, 2012) is that they are not guaranteed to be conservative enough specifically with regard to sound sources such as pile driving, "seal scarers," and high-frequency pingers. With the exception of high frequency pingers, these sources are not part of the Navy's proposed action. As detailed in Section 3.8.3.1.2.3 (Hearing Loss; see reference to Finneran (2015)) in the GOA FSEIS/OEIS, the Navy and NMFS are in the process of reviewing the latest and best available science to further refine future acoustic analyses using weighting functions.

Regarding the commenters' fourth point, NMFS and the Navy have incorporated empirical data on humans (see the GOA FSEIS/OEIS citations to Ward *et al.*, 1958, 1959a, b; and Miller *et al.*, 1963).

With regard to the references cited by the commenters: Kastak *et al.* (2008) reported PTS in a harbor seal after an exposure of 202 dB SEL at 4.1 kHz. This exposure level is 5 dB above the PTS onset criteria used by the Navy in its Phase II modeling, and thus the Navy would have predicted PTS for this exposure. The Kastak *et al.* (2008) data are therefore consistent with the criteria and thresholds used by the Navy (as described in the FSEIS/OEIS). Kujawa and Liberman (2009) reported TTS in mice of 40 dB measured 24 hours after exposure. Thresholds were found to recover completely (thus there was no PTS) but other signs of auditory damage were found, such as neural degeneration and a decrease in suprathreshold evoked response amplitudes. A similar study by Lin *et al.* (2011) with guinea

pigs found similar results after TTS of greater than 50 dB measured 24 hours after exposure. Since no lower level exposures were utilized, it is not known if the suite of auditory damage observed by Kujawa and Liberman (2009) and Lin *et al.* (2011) would have occurred with lesser exposures. The Navy's analyses assumed PTS (and thus injury) would occur after exposures producing TTS of 40 dB or more measured approximately 4 minutes after exposure. Therefore, the exposures used by Kujawa and Liberman (2009) and Lin *et al.* (2011) would have been considered injurious by the Navy criteria. Therefore, both the Kastak *et al.* (2008) and Kujawa and Liberman (2009) studies are consistent with the Navy's use of TTS of 40 dB, measured approximately 4 minutes after exposure, as an indicator for auditory injury.

Comment 13: NRDC *et al.* provided several comments, which were originally set forth in a detailed critique by Dr. David Bain, that were critical of the acoustic risk function used by the Navy and NMFS to estimate the probability of behavioral effects that NMFS would classify as harassment. The commenters assert that these risk functions are flawed and underestimate take.

Response: Dr. Bain's critique is not directly relevant to the proposed action in the GOA TMAA Study Area. It is in reference to older Navy EISs (2007 Hawaii Range Complex (HRC) Navy DEIS/OEIS; 2006 Undersea Warfare Training Range (USWTR) DEIS/OEIS) that analyze different actions in another geographic location, and is no longer current as the science has evolved over the last nine years. The criteria and thresholds for determining potential effects on marine species used in the Navy's GOA FSEIS/OEIS and related consultation documents have been appropriately revised based on the best available science since the 2006 and 2007 Draft EISs, which Dr. Bain reviewed (see Finneran and Jenkins, 2012). Dr. Bain's critique is therefore dated and not directly relevant to the proposed rule or the Navy's analysis for the GOA TMAA Study Area as presented in the GOA FSEIS/OEIS. Please also note that all comments from Dr. Bain's critique were previously responded to in the 2009 Hawaii Range Complex FEIS/OEIS and in more recent Navy FEIS/OEISs. Particular aspects of Dr. Bain's critique highlighted by the commenters are discussed in Comments and Responses 14 through 18.

Comment 14: NRDC *et al.* commented that NMFS and the Navy rely on studies of temporary threshold shift in captive animals for one of their primary sources

of data for the development of behavioral thresholds.

Response: As described in the FSEIS/OEIS section 3.8.3.1.5, the captive behavioral data gathered while conducting TTS studies is one of three data sources used to inform the behavioral response function generated to predict takes by Level B harassment—the other two studies are based on observations in the wild of killer whales and North Atlantic right whales. In order to generate a quantitative curve to predict behavioral responses, very specific information is needed regarding what levels of sound were received that are associated with the specific behavioral changes observed. While not appropriate to use to the exclusion of wild data, captive studies provide valuable insight into behavioral response and support the types of precise acoustic measurements that are necessary for generating behavioral response functions. Comparatively few field studies documenting marine mammal responses to MFAS include the specificity of data needed to appropriately inform a quantitative curve. Some field studies with informative results have been conducted subsequent to the generation of the behavioral response function used here to estimate take, and these studies have been assessed qualitatively in our analysis and NMFS and Navy have determined that the behavioral response curve used here still represents a reasonable mechanism for estimating behavioral responses that rise to the level of take given the body of science available at this time.

Comment 15: NRDC *et al.* commented that NMFS and the Navy appear to have misused data garnered from the Haro Strait incident by including only those levels of sound received by the "J" pod of killer whales when the USS Shoup was at its closest approach. They further request the Navy's propagation analysis for the Haro Strait event.

Response: Details of the analysis of the Haro Strait event were presented in the GOA FSEIS/OEIS Section 3.8.3.1.2.6 (Behavioral Reactions to Sonar and Other Active Acoustic Sources; Subsection *Odontocetes*). The propagation analysis is available from the Navy upon request. The Navy and NMFS reviewed testimony, video, and all field notes from the time of the event, and have accurately used that documented data in the analysis for the GOA activities and the Navy addressed this identical comment in more detail in its response to comments on the Hawaii Range Complex in 2007. That data clearly indicated that the behaviors observed were within the species'

normal range of behaviors and there were no immediate or general overt negative behavioral reactions observed at the time of the exposure. Furthermore, the presence of numerous small motor vessels maneuvering in close proximity to the orca further complicated the assessment of possible reactions related to sonar from a vessel and, specifically, the agencies determined that it was most appropriate to use the received levels at the closest approach of the USS Shoup because the effects when the whales were farther from the Shoup could not be deconflicted from the effects of the nearby whale-watching boats.

Comment 16: NRDC *et al.* commented that NMFS and the Navy exclude a substantial body of controlled exposure research and opportunistic studies on wild animals (and some research on other experimental animals as well, within a behavioral experimental protocol). For example, NMFS and the Navy fail to include data from the July 2004 Hanalei Bay event, in which 150–200 melon-headed whales were embayed for more than 24 hours during the Navy's Rim of the Pacific exercise.

Response: NMFS disagrees. The studies cited by the commenters are cited in the proposed rule and in the GOA FSEIS/OEIS and were fully considered in the analysis. Section 3.4 of the GOA FSEIS/OEIS contains citations to additional controlled exposure research on wild animals including, for example, DeRuiter *et al.* (2013a, b), Defence Science and Technology Laboratory (2007); Claridge and Durban (2009); McCarthy *et al.* (2011); Melcon *et al.*, (2012); Miller *et al.* (2011, 2012); Moretti *et al.* (2009); Southhall *et al.* (2011, 2012a, 2012b, 2013, 2014); Stimpert *et al.* (2014); and Tyack *et al.* (2011). As noted previously, not all studies contain the level of detailed data to be quantitatively incorporated into a behavioral response curve, and some of these studies occurred after the Navy began its modeling. However, all of the referenced studies have been considered qualitatively in the agency's analyses and our impact analyses and determinations are supported by the body of science on this topic.

Regarding the Hanalei Bay event, NMFS included an extensive analysis of this event in the "Stranding and Mortality" section of the proposed rule (81 FR 9950, 9970–76; February 26, 2016). Please see that section for further information regarding NMFS' assessment and consideration of that event. It should be noted that NMFS considered active sonar transmissions a plausible, if not likely, contributing

factor in the Hanalei stranding in what may have been a “confluence of events,” including a unique interaction of biological and physical factor—most of which are not expected to occur in the Study Area or during GOA activities. The biological factors may have included the presence of an apparently uncommon, deep-diving cetacean species (and possibly an offshore, non-resident group), social interactions among the animals before or after they entered the Bay, and/or unknown predator or prey conditions. The physical factors may have included the presence of nearby deep water, multiple vessels transiting in a directed manner while transmitting active sonar over a sustained period, the presence of surface sound ducting conditions, and/or intermittent and random human interactions while the animals were in the Bay.

Comment 17: NRDC *et al.* commented that NMFS and the Navy also fail to incorporate data on harbor porpoises and beaked whales in their dataset.

Response: NMFS disagrees with the commenters’ assessment. The Navy and NMFS have used studies on harbor porpoises and beaked whales in the data sets used for analysis. Please see Section 3.8.3.1.5 (Sonar and Other Active Acoustic Source) of the GOA FSEIS/OEIS where this information is presented. The analysis includes, for example, data from both captive and wild harbor porpoises (see Kastelein *et al.* (2000, 2005b) and Johnston (2002)) and behavioral responses from a wild population of beaked whales as documented by Tyack *et al.* (2011). Please also refer to the cited Finneran and Jenkins (2012) for additional details. Finally, please see the discussions presented in Section 3.8.3.1.6.4 of the GOA FSEIS/OEIS (Model Assumptions and Limitations), which describes the numerous conservative assumptions incorporated into the Navy’s model.

Last, in further and more specific quantitative acknowledgement of the sensitivity of these species, more conservative step functions are used to evaluate behavioral disturbance (*i.e.*, estimate take) to beaked whales and harbor porpoises (140 and 120 dB, respectively).

Comment 18: NRDC *et al.* commented that the risk function should have taken into account the social ecology of some marine mammal species.

Response: The Navy and NMFS have taken these factors into account to the best extent practical given limitations in the model and available science. Although the state of science is not complete in terms of group response by

species, life stage, or even behavioral context in which an individual or group experiences an anthropogenic sound, as detailed in the GOA FSEIS/OEIS Section 3.8.3.1.6.3 (Navy Acoustic Effects Model) and the Navy’s Determination of Acoustic Effects Technical Report (Marine Species Modeling Team, 2015), group size is accounted for in the modeling of acoustic effects, not in the risk function. The risk function predicts the percentage of the number of individuals exposed above a given level that will be taken. The model deals with the distribution of animats (virtual representations of animals) derived from density, associated group size, and depth distribution, and, therefore, the model is where group size can be addressed. Furthermore, just as one could hypothesize a naive animal on its own could potentially influence the behavior of the whole group with negative effect (resulting in a group behavioral reaction), so might an experienced individual influence the behavior of the whole group with positive effect and calm the pod so there is no reaction rising to the level of a take in any individual or the pod as a whole. In summary, the current model process (risk function, modeling) does the best job of averaging multiple inputs as well as estimating the most representative take possible.

Comment 19: NRDC *et al.* commented that NMFS’ threshold is applied in such a way as to preclude any assessment of long-term behavioral impacts on marine mammals. It does not account, to any degree, for the problem of repetition: The way that apparently insignificant impacts, such as subtle changes in dive times or vocalization patterns, can become significant if experienced repeatedly or over time.

Response: NMFS disagrees. Specifically, NMFS’ thresholds are not designed to analyze long-term impacts or repetition; they are designed to predict individual acute behavioral responses. Assessments of long-term impacts are addressed qualitatively in the narrative. This analysis is presented in the GOA FSEIS/OEIS in Section 3.8.3.1.3 (Long-Term Consequences to the Individual and the Population) and Section 3.8.4 (Summary of Impacts (Combined Impacts of all Stressors) on Marine Mammals) where cumulative impacts are addressed, as well as in the Analysis and Negligible Impact Determination section of this rule. Assessment of long-term cumulative impacts to species and stocks is also represented by the discussion in Section 3.8.5 of the GOA FSEIS/OEIS (Summary of Observations During Previous Navy

Activities). Of note, NMFS finds that the vast majority of impacts expected from sonar exposure and underwater detonations will be behavioral in nature, temporary and comparatively short in duration, relatively infrequent, and specifically not of the type or severity that would be expected to be additive for the small portion of the stocks and species likely to be exposed.

This analysis is further corroborated by the healthy, and in some locations, increasing marine mammal populations, where sonar use has been occurring for decades and is frequently in use on an annual basis, such as on instrumented ranges. As noted previously, there is no evidence that Navy activities have had or are having any long-term impact on marine mammal populations or stocks. For more information, see the *Long-Term Consequences* discussion in the “Analysis and Negligible Impact Determination” section of this rule.

Finally, the proposed Navy training activities will occur over a short period of time (up to 21 days) once a year. Further, with the change in preferred alternative to Alternative 1, the Navy activities, and resulting predicted takes, have essentially been reduced by half and consist of mainly low-level behavioral responses and occasional occurrences of TTS, with only 4 Level A harassment takes estimated for one species. As a result, long-term behavioral impacts on marine mammals within the GOA TMAA during the Northern Edge exercise are unlikely to occur.

Comment 20: NRDC *et al.* commented that while NMFS and the Navy have assigned a specific threshold to beaked whales, in light of Tyack *et al.* (2011), it is clear that some beaked whales are taken on exposure to mid frequency sonar at levels below 140 decibels (SPL).

Response: The Navy and NMFS specifically considered the Tyack *et al.* (2011) study, which was cited in the GOA FSEIS/OEIS and proposed rule, and its findings were incorporated into the threshold for beaked whales (see the GOA FSEIS/OEIS Section 3.4.3.1.6 (Behavioral Reactions)). During Tyack *et al.*’s (2011) research at the Navy’s fixed tracking range in the Bahamas, animals were observed to leave the immediate area of the anti-submarine warfare training exercise (avoiding the sonar acoustic footprint at a distance where the received level was “around 140 dB” SPL. Further, Moretti *et al.* (2014) recently derived an empirical risk function for Blainville’s beaked whale that predicts there is a 0.5 probability of disturbance at a received level of 150 dB SPL, suggesting that in some cases the current step function may over-estimate

the effects of an activity using sonar on beaked whales. Therefore, NMFS has concluded that, based on the best available science, 140 dB re 1 μ Pa (root mean square) is a conservative and appropriate threshold for predicting potential behavioral effects on beaked whales from sonar signals.

Comment 21: NRDC *et al.* commented that there are additional flaws in the Navy's acoustic effects modeling, which include: a lack of any indication that the Navy has accounted for reverberation effects in its modeling, or that its modeling sufficiently represents areas in which the risk of reverberation is greatest; and a failure to consider the possible synergistic effects on marine mammal physiology and behavior of using multiple acoustic sources in spatial and temporal proximity.

Response: NMFS disagrees. As presented in the Section 3.8.3.1.6.3 (Navy Acoustic Effects Model) of the GOA FSEIS/OEIS and in the referenced modeling technical report (Marine Species Modeling Team, 2015), the Navy's acoustic effects modeling incorporates the most up to date marine mammal density data and oceanographic data for the quantification of predicted acoustic impacts to marine mammals. Contrary to the assertions in the comment, the model does account for a fully three-dimensional environment in calculating sound propagation and exposures incorporating site-specific bathymetry, sound speed profiles, wind speed, and bottom properties into the propagation modeling process. As noted in the GOA FSEIS/OEIS, the modeling accounts for all sources within a scenario simultaneously, so this modeling approach specifically accounts for the combined (additive) effects from using multiple acoustic sources in spatial and temporal proximity (*i.e.*, the cumulative SEL is a composite of all sources received by the animal). Multiple conservative assumptions are incorporated into the model.

Comment 22: The Commission recommended 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 including ranges for more than 1 ping), and for all functional hearing groups of marine mammals within the GOA TMAA.

Response: Ranges to effects for all criteria and functional hearing groups are provided for representative active

sonars and explosives (Section 3.8.3.3.1.1, Range to Effects) in the GOA FSEIS/OEIS. Table 6 in this rule provides updated ranges to PTS and TTS for the major activity types in the context of the applicable mitigation measures. Changes for different taxa were described in more detail in the "Summary of Request" section of this Notice. See the "Summary of Request" section for further detail.

Generally speaking, for the modeled ranges, the representative sources include the most powerful active sonar source and the charge with the largest net explosive weight analyzed. NMFS believes that these representative sources provide adequate information to analyze potential effects on marine mammals. Because the Navy conducts training in a variety of environments having variable acoustic propagation conditions, variations in acoustic propagation conditions are considered in the Navy's acoustic modeling and the quantitative analysis of acoustic impacts. Average ranges to effect are provided in the GOA FSEIS/OEIS to show the reader *typical* zones of impact around representative sources rather than an inclusive list of source bins. As presented in Chapter 5 of the GOA FSEIS/OEIS, the mitigation is the same for all bins within the activity category. The presentation of a maximum range based on a worst case analysis under extreme conditions would fail to be representative and therefore potentially confuse readers by presentation of a range to effects that are extremely unlikely to ever be present in actual real world conditions.

Because the ranges to PTS for acoustic sources are relatively short, the ranges to PTS presented in the GOA FSEIS/OEIS are representative of the ranges for purposes of the discussion. In short, the information provided in the GOA FSEIS/OEIS (and updated in Table 6 here) should be considered applicable to the GOA TMAA Study Area. The approximate maximum ranges to TTS provided in the GOA FSEIS/OEIS (Table 3.8–12) are also representative of the ranges to effect and are provided in the FSEIS/OEIS to show the typical zones of impact around representative sources.

As explained in the GOA FSEIS/OEIS in Section 3.8.3.3.1.1 (Range to Effects), there is no reason to show a PTS range for more than one ping because of the short distances over which a PTS has the potential to occur. For the case of the most powerful hull-mounted source (hull-mounted mid-frequency anti-submarine warfare sonar) the ship moves beyond the PTS zone for each successive ping and there is no difference in magnitude of successive

pings. Refer to Section 3.8.3.1.1 (Non-impulsive and Impulsive Sound Sources) of the GOA FSEIS/OEIS. Pings occur approximately every 50 seconds, and each subsequent ping has the same approximate range to PTS from the bow of the ship as the first ping. Therefore, there is not sufficient overlapping energy from one ping to the next to make presentation of multiple pings useful. As noted in the comment and presented in the GOA FSEIS/OEIS, an animal would have to be exposed at the TTS level by the first ping and then continue parallel to the ship within close proximity for 50 seconds to receive a second ping, potentially resulting in a PTS level exposure. Given the science detailed in the GOA FSEIS/OEIS (see Section 3.8.3.1.7, Marine Mammal Avoidance of Sound Exposures) indicating that marine mammals will behaviorally avoid high levels of sound, the assumption that a marine mammal would not remain alongside a pinging vessel is a simple but reasonable assumption. The GOA FSEIS/OEIS and this final rule conclude that it is unlikely for an animal to maintain a speed of 10 knots and stay in close proximity to a vessel using active sonar. As presented in the GOA FSEIS/OEIS (see Section 3.8.3.3.1.1, Range to Effects), while 10 knots was the ship's speed used in the model, a ship engaged in anti-submarine warfare training could be moving at between 10 and 15 knots. For a Navy vessel moving at a nominal 10 knots, it is unlikely a marine mammal could maintain the speed to parallel the ship and receive adequate energy over successive pings to result in a PTS exposure.

Mitigation and Monitoring

Comment 23: The Commission and other commenters recommended 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 acoustics already was proposed (commenters also specifically suggested modifying sonobuoys for this purpose). NRDC *et al.* also suggested use of dedicated passive acoustic monitoring to detect vocalizing species, through established and portable range instrumentation and the use of hydrophone arrays off instrumented ranges. The Commission also questioned why passive and active acoustic monitoring used during the Navy's Surveillance Towed Array Sensory System Low Frequency Active

(SURTASS LFA) activities is not applied here.

Response: The primary purpose of the mitigation shutdowns is to avoid injury, most TTS, and more severe instances of behavioral disturbance. We note that in the current mitigation paradigm, without additional PAM or active acoustic detection as recommended by the Commission and other commenters, only four individual Dall's porpoises are anticipated to incur PTS, Level B harassment resulting in TTS is anticipated for a small number of marine mammals from a few species, and modeling predicts that zero percent of the Level B harassment takes result from exposure at closer than 1,825 m (less than 1–2 percent at closer than 4 km), which is where the mitigation shutdowns would apply. For the reasons described below, when the minimal potential likelihood of reducing impacts to marine mammal species or stocks and their habitat is weighed along with the degree of impracticability for implementing the measures suggested by commenters, NMFS finds that requiring such additional mitigation is unwarranted.

Passive acoustic monitoring is already and will continue to be implemented. As mentioned in Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring) of the GOA FSEIS/OEIS and the "Mitigation" section of this final rule, passive acoustic monitoring would be conducted with Navy assets, such as passive ships sonar systems or sonobuoys, already participating in the activity. The Navy does not have the resources to construct and maintain passive acoustic monitoring (PAM) systems for each training and testing activity. Discussion in the GOA FSEIS/OEIS Section 5.3.3.1.11 (Increasing Visual and Passive Acoustic Observations) further articulates why increased use of passive acoustics for the purpose of mitigation would be impractical with regard to implementation of military readiness activities and result in an unacceptable impact on readiness. Additionally, mitigation measures were developed based on predicted potential impacts; therefore, the use of acoustic monitoring is not always warranted, nor practicable from an operational standpoint (GOA FSEIS/OEIS Section 5.3.2.1, Acoustic Stressors). The Navy's visual mitigation has been demonstrated to be effective over the 8 years of monitoring associated with Navy training and testing at sea as reflected in publically available reports submitted to NMFS since 2006 and accessible on the NMFS Office of Protected Resources Web site (<http://www.nmfs.noaa.gov/pr/permits/>

incidental/military.htm) (see Section 3.8.5, Summary of Observations During Previous Navy Activities, of the GOA FSEIS/OEIS, for more information in this regard).

Regarding its effectiveness, passive, and active in specific cases, acoustic detection can increase the likelihood of detecting marine mammals for the purposes of implementing mitigation, although passive acoustic detection can only be effective when animals are vocalizing, and when they are vocalizing at a level and in a direction that will be detected and recognized by the sensor (only a subset of the time). Also, with the exception of the largest sound sources, the size of any ensonified zone combined with the density of marine mammals and the likelihood that they avoid loud sounds, there is only a relatively small number of times (compared to overall scope of exercises) that we would predict that animals would come within distances that require shutdowns (as noted above), and that would be further improved by the use of PAM. Additionally, sophisticated use of multiple sensors is needed in order to predict the distance and bearing of the vocalizing animals that is needed to justify implementing a shutdown. The effectiveness of PAM for mitigation implementation is somewhat further impeded by fast moving sources because of the constantly changing location of the marine mammal in relation to the moving source combined with the inability to detect the direction of movement of the animal in the moment it is detected. PAM is expensive and operationally challenging (or impossible) to implement in many cases and the Navy uses thousands of sound sources across its exercises. As described above, Navy uses PAM in certain activities where the risk is higher (*e.g.*, explosives or some hull-mounted sonar), and/or where it is notably much more practicable to use (*e.g.*, for stationary sources such as the Improved Extending Echo-ranging (IEER) system, which is a field of multiple sources). However, given the limited added conservation value added by using PAM to implement mitigation, combined with the impracticability of doing so in many cases, NMFS does not believe that additional use of PAM is warranted for all sources and we believe that the PAM use required by these regulations contributes to ensuring the least practicable adverse impact on the effected marine mammal species and stocks and their habitat.

The SURTASS LFA platforms are slow moving and deploy a high frequency active sonar (HF/M3) to identify marine mammals in close

proximity (2 km) to the SURTASS LFA vessel. The active sonar system used by SURTASS LFA is built into the system's vertical array and can only be employed in this fashion from a slow-moving or stationary platform. It is not possible to employ this system on the types of vessels used for the GOA training activities because a vertical array cannot be used on other ship classes whose mission includes speed and tactical movement while protecting aircraft carriers and other high value units. Further, in addition to the difficulty in implementation, NMFS does not generally support the use of active acoustic monitoring except in cases where it is mitigating an effect of potentially very high or singular severity and there is a high likelihood of successful use (stationary or slow-moving platforms), as it essentially equates to harassing marine mammals by putting the active detection signal in the water in order to prevent harassing marine mammals with the main sound source for which takes are being authorized. NMFS has only previously considered the use of active acoustic detection in a few situations, one for SURTASS LFA (actually implemented), in which the HF active acoustics are used from a slow-moving platform to implement mitigation and avoid impacts from a very high-level LF source, and two other situations that were never implemented—one from a dock for testing a very loud source in port, and one from a large piece of heavy machinery wherein bodily injury was a possibility.

Modifying sonobuoys to increase their bandwidth is considered impractical for the Navy because it would require significant modification to the sonobuoy receiving equipment at a substantial cost and reduce the effectiveness of the sonobuoy system's ability to detect submarines. See section 5.3.3.1.13 of the GOA FSEIS/OEIS (Increasing Visual and Passive Acoustic Observations) for further information regarding the use of passive sensors.

Comment 24: NRDC *et al.* commented that NMFS should restrict the Navy's active sonar and explosives training activities around certain important habitat areas—specifically, marine protected areas (MPAs) and recently identified and published biologically important areas (see Ferguson *et al.*, 2015) located within or in close proximity to the GOA TMAA. NRDC *et al.* also recommended that NMFS identify other time/area closures as informed by the following: (1) Temporally and spatially well-defined phytoplankton blooms occurring in portions of the TMAA and driven by the

tides, bathymetry, and eddy systems of the northern and central Gulf of Alaska; (2) relative densities of large whales within the April to October period as informed by BIA and call rate data; (3) temporal and spatial differences in the depth of the mixed layer and the sonic layer which can create different surface ducting conditions; and (4) review of major seamounts, representing potentially biologically important habitat for multiple species, within the GOA TMAA.

Other commenters recommended similar time/area-specific mitigation for Navy training activities, including avoidance of seamounts and BIAs, and restriction of training during the spring/summer time period.

Response: Mitigation measures that include spatio-temporal avoidance of biologically important areas, MPAs, and other marine species habitat (e.g., seamounts) within the GOA TMAA Study Area were fully considered and are discussed in the “Consideration of Time/Area Limitations” section of this final rule.

As discussed in the proposed and final rules and in the GOA FSEIS/OEIS, biologically important feeding areas for North Pacific right whale and migration areas for gray whale (Ferguson *et al.*, 2015) overlap small portions of the western edge/corners of the TMAA. The overlap is small both spatially for both, and temporally for gray whale migration (November through January and March through May; Navy activities within the TMAA have historically occurred in summer months). As discussed in “Consideration of Time/Area Limitations,” it is unlikely that Navy explosive and sonar training would occur in these nearshore locations adjacent to the GOA TMAA boundary where the overlap with BIAs occurs. Therefore, North Pacific right whales and gray whales in the feeding or migration areas at these boundaries of the GOA TMAA are unlikely to have their feeding or migration activities affected by Navy training activities using sonar and other active acoustic sources. However, after considering the small population size of North Pacific right whales, the rarity of their detections and general lack of sightings within the GOA TMAA, and the extremely limited current information about this species, NMFS is requiring a North Pacific right whale “Cautionary Area” between June and September in the overlapping 2,051 km² portion of the North Pacific right whale feeding area (See Figure 3.8–4 of the GOA FSEIS/OEIS), in which no hull-mounted sonar or explosives would be used within the portion of the feeding area

that overlaps the Navy’s GOA TMAA during those months, except when required by national security needs. In the event of national security needs, the Navy would be required to seek approval in advance from the Commander, U.S. Third Fleet prior to conducting training activities using sonar or explosives. NMFS believes that implementation of this North Pacific right whale Cautionary Area within the GOA TMAA may provide additional protection of this species and stock beyond the mitigation measures already proposed by the Navy in the proposed rule and GOA FSEIS/OEIS. In the case of the gray whale migratory area, given the extremely minimal spatio-temporal overlap with Navy training activities in the GOA TMAA, coupled with the fact that no takes of gray whale are predicted to occur with the proposed level of training effort, NMFS has determined that additional mitigation measures related to time/area limitations of Navy training activities within the overlapping portion of the migratory area are not warranted, nor would avoidance of this area contribute to the least practicable impact standard or any lessening of the likelihood of adverse impacts on the species or stocks.

Very few MPAs are located near or within the GOA TMAA. MPAs vary widely in purpose, level of protection, and restrictions on human uses. As discussed in “Consideration of Time/Area Limitations” and in the GOA FSEIS/OEIS, MPAs in the vicinity of the GOA TMAA generally focus on natural heritage, fishery management, and sustainable production. The identified impacts and purpose for the designation of these areas is to limit or restrict specific fishing activities, and the Navy would fully abide by the regulations (mainly restrictions on commercial and recreational fishing) of the individual MPA and relevant resources. Since the Navy does not engage in fishing activities, restricting Navy training activities in these areas would be ineffective at preventing the identified impacts caused by fishing. Our issuance of an authorization to take marine mammals would not conflict with the management, protection, or conservation objectives of these MPAs. Therefore, NMFS has determined that Navy avoidance of these areas is not warranted, nor would it contribute to the least practicable impact standard or any lessening of the likelihood of adverse impacts on species or stocks.

While seamounts may represent important habitat for multiple species (including marine mammals), the major seamounts located within the TMAA (e.g., Dall, Quinn, and Giacomini

seamounts) have been designated by NOAA as Gulf of Alaska Seamount Habitat Protection Areas specifically to help maintain productivity of fisheries resources through restrictions on bottom fishing. Moreover, NMFS’ review of the passive acoustic monitoring results in the Navy’s annual monitoring reports (2011–2015) for GOA generally does not suggest significantly greater use of these seamounts by marine mammals (at least for those where HARPS were deployed; it is also important to note that an animal may be located several miles away from where it is detected) compared to other locations (shelf and slope) where detections were recorded. Navy monitoring efforts indicate that beaked whales appear to use both shelf and seamount sites, although detections were generally low at the monitored seamount sites within the TMAA and may in fact be more prevalent at the slope site. Fin and humpback callings peaked in winter when Navy activities are not proposed to occur. Fin and sperm whale detections were generally more prevalent at shelf and slope sites, respectively. Blue whale calls were detected at all sites. North Pacific right whale calls were last detected in 2013, on the Quinn Seamount site; however, analysis of these detections indicated that the calls were detected from ranges on the order of roughly up to 50 nm to the east of the site; the calling animal was not in the vicinity of Quinn Seamount (Debich *et al.*, 2014; Sirović *et al.*, 2014). The Navy has been training with sonar and other systems for decades in locations having seamounts or slope areas, or that are adjacent to continental shelves where, to date, there has been no evidence of any long-term consequences for individuals or populations of marine mammals. This finding is based on years of research and monitoring that show, for example, higher densities and long-term residency by species such as beaked whales in Southern California, where the Navy trains and tests, than in other adjacent areas. Further, the Navy has identified the need to train in varied bathymetric conditions, including around seamounts specifically. Restricting Navy training to areas away from these bathymetric features would eliminate the ability to train as needed in these complex environments and would reduce the realism of the military readiness activity, while simultaneously providing limited protective value.

It is not practicable to require limited activity during phytoplankton blooms. The key consideration is these features are highly variable temporally and spatially throughout the entire Gulf of

Alaska both inside and outside of the TMAA. Monthly, annual, inter-annual, and decadal oceanographic conditions will drive the establishment and disestablishment of these areas which cannot be predicted in terms of the GOA TMAA authorization. In review of 15 years of oceanographic data from 1992–2006, Henson and Thomas (2008) for instance discuss how anticyclonic oceanographic eddies that pull most of the near shelf nutrients into offshore waters can have substantial inter-annual variability in number and propagation paths from east to west. These eddy zones and entrained nutrients would highly influence phytoplankton blooms. Henson and Thomas (2008) also showed seasonal patterns with strongest spring and summer eddy zones likely to be in the north-northeast slope area of the Gulf of Alaska, in areas outside of the GOA TMAA. Late spring and early summer (May to July) is the most likely period for any Navy major training event. Given this degree of variability, it would be impractical to consider on an annual basis which areas would likely contain the presence of these phytoplankton blooms, or how long a given bloom would persist even if an eddy were present.

NMFS notes that the call rate data cited by the commenters, as well as the Navy's more recent and more robust passive acoustic data from 2011–2015, only provide occurrence specifically for that part of a given species' population that may be calling at a particular time. The Navy data set alone represents over 58,953 hours or 2,456 days' worth of passive acoustic data that has been collected, analyzed, and results reported. The science of density and relative density estimation from passive acoustic data is still being researched under funding from several different Navy programs. For example, the current Navy funded research is focusing on aspects such as the proper characterization of calling rates, range of detection, and group size, all of which can vary by species, region, time of year/day, sex, etc. All of these variables can impact the resulting density estimate, and therefore the method of incorporating these variables needs to be investigated further. Meanwhile, the best available density data (available at <https://www.goaeis.com/Documents/SupplementalEISOEISDocumentsandReferences/SupportingTechnicalDocuments.aspx>), which was used in the Navy's FSEIS/OEIS and this rule to calculate take, does not support the designation of restricted areas within the TMAA. First, density estimates for many of the species are uniform across

the entire TMAA (e.g., Cuvier's beaked whales, Minke whales, gray whales) and other species have simple models with only a few strata (meaning that there is one uniform density value in a zone, with a few zones: Typically shelf, slope, deep, and sometimes a differential at the southern edge of the deep water that is closer to the sea mounts), but different strata are high-density for different species. For example, fin whales are densest on the shelf, decreasing in slope strata, with lowest density in deep water, while sei whales are densest in the deep waters and least dense on the shelf. This means that restricting activities in one area that is important to one species would intensify activities in an area that is important to another species. Additionally, the Navy has specifically noted the importance of training across these multiple bathymetric features, so creating a time/area closure that mirrors a bathymetric strata (e.g., the whole slope, or the whole shelf) is inherently detrimental to the Navy's mission. Separately, though, the Navy has also noted in the description of its action that more hazardous activities, such as those that use explosives, are generally not conducted on the edges of the TMAA, due to safety and proximity to coastal areas.

With respect to surface ducting conditions, environmental conditions in the Gulf of Alaska during the timeframe when Navy training activities would generally occur do not support surface ducting conditions. A surface duct requires cold water at the surface with warmer water at deeper depths which is highly unlikely during the warmer summer months in the Gulf of Alaska when training has historically occurred. In addition, there has been no indication that mixed layer depth has any direct influence on marine mammal behavior or response to anthropogenic sounds.

Regarding the benefits of the proposed time/area limitations that NMFS has decided not to require, it is possible that the application of one or more of these areas could potentially decrease the number of takes of one species or another, depending on when and where the exercise ended up taking place. However, as we have explained, due to the nature of the exercise (short duration) and the effectiveness of the existing mitigation measures, the anticipated impacts are already expected to be primarily lower-level behavioral responses and are not anticipated to occur in times or places where impacts would be more likely to lead to fitness effects on individuals. When the limited anticipated potential

benefit to marine mammal species and stocks of applying these measures is combined with the impracticability of implementation, NMFS has concluded that requiring these measures is not warranted. NMFS has determined that the mitigation measures required by this rule, including those clarified or updated above (see "Consideration of Time/Area Limitation"), are adequate means of effecting the least practicable adverse impacts on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, while also considering personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

NMFS agrees with NRDC and other commenters that there continues to be a need to better understand the spatial distribution and occurrence of marine mammals within the Gulf of Alaska, including the use of potentially important habitat areas within the GOA TMAA. Therefore, NMFS envisions a more focused monitoring effort in the GOA TMAA during the Phase II training activities. Objectives of any future monitoring in the GOA TMAA will be discussed during upcoming NMFS-Navy adaptive management meetings in 2017.

Comment 25: NRDC *et al.* suggested the use of sonar and other active acoustic systems at the lowest practicable source level, with clear standards and reporting requirements for different testing and training scenarios.

Response: The Navy uses active sonar at the lowest practicable source level consistent with mission requirements. See Section 5.3.3.1.3 of the GOA FSEIS/OEIS (Reducing Sonar Source Levels and Total Number of Hours) for further information.

Comment 26: NRDC *et al.* suggested expansion of the marine species "safety zone" to a 4 km shutdown, reflecting international best practice, or 2 km, reflecting the standard prescribed by the California Coastal Commission for similar activities in Southern California.

Response: Section 5.3.3.1.14 of the GOA FSEIS/OEIS (Increasing the Size of Observed Mitigation Zones) discusses mitigation zone expansion. See also Section 5.3.3.1.16 of the GOA FSEIS/OEIS (Adopting Mitigation Measures of Foreign Navies). There is no internationally recognized best practice with regard to mitigation zone distance. The Navy developed activity-specific mitigation zones based on the Navy's acoustic propagation model. As described previously, each recommended mitigation zone is

intended to avoid or reduce the potential for onset of the lowest level of injury, PTS, out to the predicted maximum range. Mitigating to the predicted maximum range to PTS consequently also mitigates to the predicted maximum range to onset mortality (1 percent mortality), onset slight lung injury, and onset slight gastrointestinal tract injury, since the maximum range to effects for these criteria are shorter than for PTS. Furthermore, in many cases, the mitigation zone actually covers the TTS zone.

Implementation of mitigation measures is most effective when the mitigation zone is appropriately sized to be realistically observed. The mitigation zones contained in this final rule represent the maximum area the Navy can effectively observe based on the platform of observation, number of personnel that will be involved, and the number and type of assets and resources available. As mitigation zone sizes increase, the potential for reducing impacts decreases. For instance, if a mitigation zone increases from 1,000 to 4,000 yd (914 to 3,658 m), the area that must be observed increases sixteen-fold, which is not practicable. The Navy does not have the resources to maintain additional Lookouts or observer platforms that would be needed to effectively observe mitigation zones of increased size. The mitigation zones contained in this final rule balance the need to reduce potential impacts with the Navy's ability to provide effective observations throughout a given area.

Comment 27: NRDC *et al.* suggested that the Navy delay or relocate activities when beaked whales are detected through passive acoustic monitoring and when significant aggregations of any species or particularly vulnerable or endangered species (or even sightings of single North Pacific right whales) are detected by any means in the vicinity of an exercise, even if potentially occurring beyond the established mitigation zone.

Response: Mitigation will be implemented within the mitigation zone for all marine mammals regardless of species or numbers of animals if they approach or enter a mitigation zone. NMFS disagrees that it is necessary to delay or relocate activities when beaked whales, North Pacific right whales, other sensitive species, or significant aggregations of marine mammals are detected outside the mitigation zones. For the GOA activities, the Navy developed each recommended mitigation zone to avoid or reduce the potential for onset of the lowest level of injury, PTS, out to the predicted

maximum range. Furthermore, in many cases, the predicted maximum range to PTS also consequently covers the predicted average range to TTS and further alleviates the likelihood of more severe behavioral responses that might be anticipated at higher level exposures. The activity-specific mitigation zones are based on the longest range for all the functional hearing groups. The mitigation zone for a majority of activities is driven by either the high-frequency cetaceans or the sea turtle functional hearing groups. Therefore, the mitigation zones are even more protective for the remaining functional hearing groups (*i.e.*, low-frequency cetaceans, mid-frequency cetaceans, and pinnipeds). The predicted ranges are based on local environmental conditions and are unique to the GOA TMAA Study Area.

With respect to passive acoustic monitoring, all passive acoustic detections will be reported to Lookouts to increase vigilance of the visual surveillance. However, as stated previously, passive acoustic monitoring can neither provide range or bearing to detected animals, and therefore cannot provide locations of these animals.

As described previously, Navy watchstanders report both inanimate objects and marine mammals. Although they attend training to understand more about marine mammals, they are not expected to be able to identify animals at the species level and they report only with the specificity that they can (typically whether the marine mammal observed was a whale, dolphin, or pinniped). Therefore, they would not be able to implement mitigation measures that require identification of specific species (and we have described previously why the Navy cannot utilize non-Navy trained observers). Moreover, the 2011 and 2015 exercise reports for GOA indicate that during these previous training exercises, watchstanders had a total of 4 and 31 sightings, respectively (10 and 68 marine mammals). Only 2 sightings occurred when sonar was operating. Only 5 sightings included more than 3 animals, and the vast majority were of a single animal. This data suggests that shutting down for aggregations would not actually occur with any regularity and would not, therefore, be expected to contribute to any meaningful reduction of impacts on marine mammals.

The additional mitigation measure recommended by commenters is designed to further reduce the numbers of takes by Level B harassment, focusing on aggregations or endangered species. One point that is often overlooked is that when a training exercise is

interrupted for a shutdown, it does not just start back up; training exercises often involve a series of actions and movements that develop over a period of time. Also, the effectiveness of some of the exercises involving certain types of targets with a limited battery life can be jeopardized if restarts result in the exercise length exceeding the needed battery life. It is difficult to predict how much of an exercise will need to be redone, but it is safe to say that shutting down will typically result in a longer total duration of sound source operation as operators reacquire targets or otherwise get back to where they were before the shutdown—potentially increasing impacts.

In short, the existing mitigation measures for marine mammals minimize the likelihood of PTS, TTS, or more severe behavioral responses and, with the addition of the North Pacific Right Whale Cautionary Area, ensure that takes are not occurring in particularly important areas or times that would be more likely to result in impacts on individual fitness. Additionally, as explained throughout this final rule, the predicted Level B harassment authorized is expected to be of a lower level type of effect, of short duration, and unlikely to adversely impact reproductive success or survivorship of any individuals (the type of effects that would lead to population-level impacts). Further, there are comparatively low numbers of Level B harassment authorized for endangered and threatened whales, and only three annual takes of North Pacific right whales. In addition to the fact that the current watchstander requirements do not support the implementation of any measures that require species identification, shutdowns beyond those currently recommended to minimize more severe effects will have limited, if any, ability to reduce impacts on marine mammal species or stocks and their habitat, while being disruptive to Navy training and potentially lengthening the overall time that sound sources are operating. For these reasons, NMFS does not believe that these measures are warranted.

Comment 28: NRDC *et al.* suggested use of simulated geography (and other work-arounds) to reduce or eliminate chokepoint exercises in near-coastal environments, particularly within canyons and channels, and use of other important habitat. Other commenters recommended Navy simulation of training activities as well.

Response: There are no chokepoint exercises in the Study Area. Further, the Navy does have a particular set of monitoring measures (intended to help

reduce the chance of a stranding) that would be applied if a combination of circumstances exist that are thought to make a stranding more likely (e.g., steep bathymetry, multiple vessels using sonar in a single area over an extended period of time, constricted channels or embayments). However, a combination of these environmental and operational features is not present in the GOA TMAA Study Area.

As discussed in Section 2.3.2.4 (Simulated Training) of the 2011 GOA FEIS/OEIS and Section 5.3.3.1.2 (Replacing Training with Simulated Activities) of the GOA FSEIS/OEIS, the Navy uses computer simulation for training whenever possible. However, training in near-coastal environments is an essential component to maintaining military readiness. Computer simulation can provide familiarity and complement live training; however, it cannot provide the fidelity and level of training necessary to prepare naval forces for deployment. Sound propagates differently in shallower water and operators must learn to train in this environment. Additionally, submarines have become quieter through the use of improved technology and have learned to hide in the higher ambient noise levels of the shallow waters of coastal environments. In real world events, it is highly likely Sailors would be working in, and therefore must train in, these types of areas. The littoral water space is also the most challenging area to operate in due to a diverse acoustic environment. It is not realistic or practicable to refrain from training in the areas that are the most challenging and operationally important. Operating in near-coastal environments is essential in order to provide realistic training on real world combat conditions with regard to shallow water sound propagation.

Comment 29: NRDC *et al.* suggested avoidance or reduction of training during months with historically significant surface ducting conditions; delay of activities or use of power-downs during significant surface ducting conditions; and use of additional power-downs when significant surface ducting conditions coincide with other conditions that elevate risk.

Response: As discussed in a previous response to comments above, environmental conditions in the Gulf of Alaska during the timeframe when Navy training activities would generally occur do not support surface ducting conditions. A surface duct requires cold water at the surface with warmer water at deeper depths which is highly unlikely during the warmer summer

months in the Gulf of Alaska when training has historically occurred. In addition, although it is possible that a higher number of animals might be taken by Level B harassment in those moments when Navy training overlaps with surface ducting condition or be exposed to slightly higher levels than otherwise as the sound from nearby sources might propagate farther, there has been no indication that mixed layer depth has any direct influence on marine mammal behavior or response to anthropogenic sounds.

NMFS also notes that avoiding or reducing active sonar during surface ducts for the purpose of mitigation would increase safety risks to personnel, be impractical with regard to implementation of military readiness activities, and result in unacceptable impacts on readiness for the following reasons: The Navy must train in the same manner as it will fight. Submarines have long been known to exploit the phenomena associated with surface ducting. Therefore, training in surface ducting conditions is a critical component to military readiness because sonar operators need to learn how sonar transmissions are altered due to surface ducting, how submarines may take advantage of them, and how to operate sonar effectively in this environment. Avoiding activities during periods with surface ducting conditions or requiring the use of power-downs during surface ducting conditions would reduce a sonar operator's ability to effectively operate in a real world combat situation, thereby resulting in an unacceptable increased risk to personnel safety and the ability to achieve military readiness. Furthermore, avoiding surface ducting would be impractical to implement because ocean conditions contributing to surface ducting change frequently, and surface ducts can be of varying duration. See section 5.3.3.1.9 of the GOA FSEIS/OEIS for more information on avoiding or reducing activities during surface ducting conditions.

In conclusion, in the case of a Navy operation overlapping with a surface duct, it is possible that some higher number of animals might be taken by Level B harassment in those moments, or exposed to slightly higher levels than otherwise as the sound from nearby sources might propagate farther—and therefore, numbers of Level B harassment might be lowered slightly by avoiding a surface duct. However, a slight reduction in takes of this sort would not be expected to contribute meaningfully to a reduction in adverse impacts on species or stocks given the already low number and level of takes

anticipated and the fact that the existing measures are expected to minimize the likelihood of injury, TTS or more severe behavioral responses, and impacts to North Pacific Right Whales in a known feeding area. When the minimal potential likelihood of reducing impacts to marine mammal species or stocks and their habitat is weighed along with the degree of impracticability for implementing this measure, NMFS finds that requiring it is unwarranted.

Comment 30: NRDC *et al.* suggested that the Navy plan their ship tracks to avoid embayments and provide escape routes for marine mammals.

Response: First, the GOA TMAA is an open water area that does not include any embayments and, therefore, operations are not expected to block escape routes for marine mammals. Further, NMFS notes that the Navy has a particular set of monitoring measures (intended to help reduce the chance of a stranding) that would be applied if a combination of circumstances exist that are thought to make a stranding more likely (e.g., steep bathymetry, multiple vessels in a single area over an extended period of time, and in areas of constricted channels or embayments). However, a combination of these environmental and operational features is not present in the GOA TMAA Study Area.

The majority of Navy training activities involving “ship tracks” would occur in the offshore portion of the Study Area and therefore would not involve embayments. In inland waters where there may be areas that could be considered embayments, ship tracks are generally constrained by the vessel traffic separation scheme, safety of operation, and mission requirements. See Section 5.3.3.1.6 of the GOA FSEIS/OEIS (Limiting Access to Training Locations) for further information regarding limiting the location of activities.

Comment 31: Several commenters suggested that the Navy limit their activities to periods of good visibility. More specifically, NRDC *et al.* suggested that all weapons firing in missile and bombing exercises involving detonations exceeding 20 lb. net explosive weight take place during the period 1 hour after sunrise to 30 minutes before sunset.

Response: NMFS believes that effective mitigation measures are already in place to address missile and bombing exercises. Specifically, explosive activities are already expected to only result in small amounts of take of one species (Dall's porpoise). Further, since the proposed rule, Navy has eliminated two SINKEXs from the

proposed actions and MISSILEX in the GOA TMAA do not utilize live ordnance.

The Navy must train at night and in low-visibility conditions to ensure personnel may operate in similar conditions when required for actual operations. After sunset and prior to sunrise, watch personnel employ night visual search techniques, which could include the use of night vision devices. Please see the "Mitigation" section of the rule for further information. Section 5.3.3.1.8 of the GOA FSEIS/OEIS (Avoiding or Reducing Active Sonar at Night and During Periods of Low Visibility) also discusses activities conducted during varying environmental conditions.

In conclusion, the anticipated impacts from explosives are already low and there are detection techniques in place that are expected to avoid some of the nighttime exposures of marine mammals. It is difficult to predict the added value of avoiding nighttime explosive exercises completely above the exposures that will be avoided by implementing nighttime detection techniques—and further, how this might translate to any reduction in the already low explosive take numbers for Dall's porpoise. At any rate, when this small potential benefit is weighed against the impracticability of the Navy being unable to train in realistic environments, NMFS finds that this measure is unwarranted.

Comment 32: NRDC *et al.* suggested suspension or postponement of chokepoint exercises during surface ducting conditions and scheduling of such exercises during daylight hours.

Response: There are no chokepoint exercises in the GOA TMAA Study Area. See our response to the comment above regarding avoiding or reducing activities during surface ducting conditions. Also, see our response to the comment above regarding avoidance of activities at night.

Comment 33: NRDC *et al.* suggested use of dedicated aerial monitors during chokepoint exercises, major exercises, and near-coastal exercises.

Response: There are no chokepoints proposed for the Study Area. Please refer to Section 2 of the GOA FSEIS/OEIS for a detailed description of the action. As described throughout Chapter 5 of the GOA FSEIS/OEIS and in this rule (see "Mitigation" section), visual observation (aerial and vessel-based) would be conducted in association with Navy activities. With respect to the potential benefits of specific aerial monitoring, the point of such monitoring would be to augment detection of marine mammals for the

implementation of shutdown measures, which are designed to prevent PTS, minimize TTS, and minimize more severe behavioral responses. NMFS' response to Comment 23 describes the minimal additional reduction of adverse impacts to marine mammal species or stocks that is likely to be gained by further increasing the effectiveness of shutdown measures. In short, zero percent of Level B harassment takes are expected to occur within approximately 1,825 m (which encompasses the shutdown area), and only 4 injurious (PTS) takes are expected to occur to one species.

With respect to practicability, specific aerial monitoring is not typically feasible given the limited duration of typical monitoring flights (less than four hours). In addition, there are significant flight safety considerations and airspace restrictions during many Navy exercises when larger groups of military aircraft are present in high numbers at various altitudes. When the minimal potential benefit of this measure is weighed along with the impracticability, NMFS believes that the measure is not warranted.

Comment 34: NRDC *et al.* suggested use of aerial surveys and ship-based surveys before, during, and after multi-unit exercises.

Response: As described throughout Chapter 5 of the GOA FSEIS/OEIS and in the "Mitigation" section of this rule, visual observation (aerial and vessel-based) would be conducted in association with Navy activities. The commenter did not describe what the purpose of these surveys would be (*e.g.*, to collect information, to delay or shutdown activities, etc.) and therefore it is difficult to evaluate how these suggested measures may or may not reduce adverse impacts to marine mammal species or stocks. However, please see other comment responses addressing the limited value of augmenting detection to facilitate shutdowns.

With respect to practicability, specific aerial monitoring is not typically effective or feasible given the limited duration of typical monitoring flights (less than four hours). In addition, there are significant flight safety considerations and airspace restrictions during Navy training when military aircraft are present in high numbers at various altitudes. Ship-based surveys before, during, and after multi-unit exercises are impractical due to the large amount of resources required and the significant impact such a requirement would have on readiness. In addition to the mitigation and monitoring required by this rule, which

have proven to be effective, the Navy is also committed to a robust marine mammal monitoring program designed to answer specific questions about the effects of the Navy's activities on marine mammals.

Comment 35: NRDC *et al.* suggested use of all available range assets for marine mammal monitoring.

Response: The commenter did not specify the purpose of this monitoring or the specific assets referred to, so it is difficult to evaluate any potential benefits to marine mammal species or stocks along with any specific practicability issues; however, please see responses to other comments in this section recommending methods for augmenting detection. NMFS has worked with the Navy over the years to help develop the most effective mitigation protocols using the platforms and assets that are available for monitoring. The required mitigation measures in this document represent the maximum level of effort (*e.g.*, numbers of Lookouts and passive sonobuoys) that the Navy can commit to observing mitigation zones given the number of personnel that will be involved and the number and type of assets and resources available. Furthermore, there are no permanent Navy range assets or supporting infrastructure established in or near the GOA TMAA, which is a temporarily used area only.

Comment 36: Some commenters believe that using Lookouts as the primary strategy for limiting potential impacts from Navy activities is inadequate. NRDC *et al.* suggested the use of additional Lookouts, and the use of NMFS-certified observers for marine mammal detection. Other commenters recommended use of independent observers on all Navy vessels. Several commenters requested further information on the Navy's Lookout effectiveness study. More specifically, NRDC *et al.* suggested that the Navy complete a Lookout effectiveness study comparing the abilities of Navy vessel-based Lookouts and experienced marine mammal observers (MMOs), and a requirement for NMFS-certified lookouts or other monitoring enhancements if Navy observers are significantly less likely to detect marine mammals.

Response: One key component of the monitoring and mitigation required by this rule is the shipboard Lookouts (also known as watchstanders), who are part of the standard operating procedure that ships use to detect objects (including marine mammals) within a specific area around the ship during events. The Lookouts are an element of the Navy's monitoring plan, as required by NMFS

and specified in the LOA. The goal of Lookouts is to detect marine mammals entering ranges of 200, 500, and 1,000 yd (183, 457, and 914 m) around the vessel, which correspond to distances at which various mitigation actions should be performed. In addition to the Lookouts, officers on the bridge search visually and sonar operators listen for marine mammal vocalizations.

NMFS disagrees that using Lookouts as the primary strategy for limiting potential impacts from Navy activities is inadequate. Navy Lookouts are qualified and experienced observers of the marine environment. All Lookouts take part in Marine Species Awareness Training so that they are better prepared to spot marine mammals. Their duties require that they report all objects sighted in the water to the Office of the Deck (OOD) and all disturbances that may be indicative of a threat to the vessel and its crew. Lookouts are on duty at all times, day and night, when a ship or surfaced submarine is moving through the water. Visual detections of marine mammals would be communicated immediately to a watch station for information disseminations and appropriate mitigation action. The number of Lookouts required for each activity represents the maximum level of effort (e.g., numbers of Lookouts and passive sonobuoys) that the Navy can commit to observing mitigation zones given the number of personnel that will be involved in an activity and the number and type of assets and resources available. The number of Lookouts that the Navy uses for each activity often represents the maximum capacity based on limited resources (e.g., space and manning restrictions). NMFS has carefully considered Navy's use of Lookouts and determined that, in combination with the other mitigation measures identified, the Navy's mitigation plan will effect the least practicable adverse impacts on marine mammal species or stocks and their habitat.

Navy personnel are extensively trained in spotting items on or near the water surface. The use of third-party observers (e.g., NMFS-certified protected species observers) in air or on surface platforms in lieu of or in addition to existing Navy Lookouts for the purposes of mitigation is impractical for the following reasons: The use of third-party observers would compromise security for some activities involving active sonar due to the requirement to provide advance notification of specific times and locations of Navy platforms; reliance on the availability of third-party personnel could impact training and testing

flexibility; the presence of additional aircraft in the vicinity of naval activities would raise safety concerns; and there is limited space aboard Navy vessels.

In 2010, the Navy initiated a study designed to evaluate the effectiveness of the Navy Lookout team versus experienced MMOs. The University of St. Andrews, Scotland, under contract to the Navy, developed an initial data collection protocol for use during the study. Between 2010 and 2012, trained Navy marine mammal observers collected data during nine field trials as part of a "proof of concept" phase. The goal of the proof of concept phase was to develop a statistically valid protocol for quantitatively analyzing the effectiveness of Lookouts during Navy training exercises. Field trials were conducted in the HRC, SOCAL Range Complex, and Jacksonville Range Complex onboard one frigate, one cruiser, and seven destroyers. Preliminary analysis of the proof of concept data is ongoing. The Navy is also working to finalize the data collection process for use during the next phase of the study. While data was collected as part of this proof of concept phase, those data are not fairly comparable because protocols were being changed and assessed, nor are those data statistically significant. Therefore, it is improper to use these data to draw any conclusions on the effectiveness of Navy Lookouts at this time.

Comment 37: NRDC *et al.* suggested the use of dedicated aerial monitoring for all Navy explosive activities using time-delay firing devices and/or all activities involving explosives greater than 20 lb net explosive weight.

Response: There are no time-delay devices proposed for use in the Study Area. More importantly, with the existing mitigation, only one species (Dall's porpoise) is expected to be taken by exposure to explosives, and for that species only 4 takes resulting in PTS are expected, leaving very few impacts that could potentially be mitigated. In addition, it is difficult to know what additional value will be added by the aerial observers beyond the existing ship-based observers. When the potential benefits of this measure are considered along with the cost, safety, and impracticality issues laid out in response to Comment 33, NMFS does not believe this measure is warranted.

Comment 38: NRDC *et al.* suggested the use of gliders or other platforms for pre-activity monitoring to avoid significant aggregations of marine mammals.

Response: The development of passive acoustic detectors on gliders

and other platforms is still in the research and development stages under funding from the Office of Naval Research and the Navy's Living Marine Resources programs. While promising, many of the various technologies are still being tested and not ready for transition to compliance monitoring where a higher degree of performance is needed. Gliders, even if able to report in real-time or delayed near real-time, would only be able to document the presence of marine mammals, not the distance of the marine mammals from the glider or individual animal movement, and therefore would not be fully effective in supporting mitigation that results in delayed operations or shutdowns. Moreover, gliders would only provide an indication that animals are in the area, but these same animals could easily move substantial distances over the course of just a few hours. In some cases, use of gliders in and around where Navy submarines also operate is an underwater safety hazard to the submarine and to the glider. Gliders and other passive acoustic platforms, therefore, are more appropriate for broad area searches within Navy ranges to document marine mammal seasonal occurrence, but are not practical as a mitigation tool.

Additionally, as noted previously, the higher level effects that shutdowns mitigate (PTS, TTS, and more severe behavioral effects) are already minimal as modeled. Further, in the two previous exercises for which we have reports (2011 and 2015), only two observations of marine mammals occurred when sonar was in operation, suggesting that augmentation of detection capabilities would not necessarily result in fewer exposures to marine mammals. For these reasons, NMFS has not required the use of these additional platforms.

Comment 39: NRDC *et al.* recommended that the Navy comply with underwater detonation and gunnery exercise mitigation measures as set forth in NMFS' 2009 final rule (74 FR 3882; January 21, 2009) for the SOCAL Range Complex.

Response: The commenters do not elaborate on why the mitigation measures for underwater explosives and gunnery exercises—which are unrelated activities—for the SOCAL Range Complex would be more protective than those currently proposed for similar activities in the GOA TMAA Study Area. Moreover, mitigation measures designed for training and testing activities in the SOCAL Range Complex are not directly applicable to GOA activities. Mitigation measures for underwater detonations and gunnery

exercises for GOA are described in the “Mitigation section” and regulatory text of this rule. NMFS has determined that these mitigation measures are adequate means of effecting the least practicable adverse impacts on marine mammal species or stocks and their habitat

Comment 40: NRDC et al.

recommended avoidance and reduction in the use of timer delays in favor of explosives with positive controls.

Response: There are no time-delay devices proposed for use in the Study Area. Please see Chapter 2 of the GOA FSEIS/OEIS for a detailed description of the action.

Comment 41: NRDC et al.

recommended application of ship-speed restriction (*e.g.*, of 10 knots) for support vessels and/or other vessels while transiting high-value habitat for baleen whales and endangered species, or other areas of biological significance, and/or shipping lanes.

Response: The Navy typically chooses to run vessels at slower speeds for efficiency to conserve fuel when possible, which may include speeds less than 5 knots or completely stopped for launching small boats, certain tactical maneuvers, target launch, or retrievals of unmanned underwater vehicles, etc. However, some operational requirements mean that Navy vessels must exceed 10 knots due to unique training, testing, or safety requirements for a given event. Further, imposing an artificial speed restriction only on Navy vessels, which represent an extremely small percentage of ship traffic, particularly in areas of high commercial traffic where no other limits exist, could create safety or navigation concerns where Navy vessels are not traveling at speeds consistent with surrounding traffic.

As discussed earlier in this rule in the “Mitigation” section and in Section 5.3.2.2 of the GOA FSEIS/OEIS (Physical Disturbance and Strike), the Navy’s speed protocol is as follows: While in transit, Navy vessels shall be alert at all times, use extreme caution, and proceed at a “safe speed” so that the vessel can take proper and effective action to avoid a collision with any sighted object or disturbance, including any marine mammal or sea turtle and can be stopped within a distance appropriate to the prevailing circumstances and conditions. Other mitigation measures will be implemented to avoid vessel strikes, such as maneuvering to keep at least 500 yards from whales observed in a vessel’s path, and not approaching whales head-on, provided it is safe to do so. The Navy will also be required to report any vessel strike.

Navy ship speed has not been implicated in impacts to marine mammals in the GOA TMAA Study Area. As discussed in the “Take Request” section and elsewhere in this rule, there has never been a recorded vessel strike of marine mammals during any training activities in the Study Area. The Navy’s proposed actions would not result in any appreciable changes in locations or frequency of vessel activity in the GOA TMAA. The manner in which the Navy has trained would remain consistent with the range of variability observed over the last decade, so neither the Navy nor NMFS anticipate that vessel strikes would occur within the Study Area during training events, and NMFS has not authorized take by ship strike.

While NMFS would never say that a ship strike is absolutely impossible where vessels are in use, the probability here given historical data in the region and the comparatively small number of vessels is considered to so small as to be discountable. Therefore, ship speed restrictions would not be expected to reduce adverse impacts on marine mammal species or stocks and their habitat in any measurable manner. When this is coupled with the operational challenges of reducing speed (navigational and safety hazards or training impacts), the measure is not warranted.

Comment 42: NRDC et al.

recommended application of mitigation prescribed by state regulators, by the courts, by other navies or research centers, or by the U.S. Navy in the past or in other contexts.

Response: NRDC did not mention any specific measures and therefore this recommendation cannot be evaluated in the context of the least practicable adverse impact standard. NMFS and the Navy worked together on developing a comprehensive set of mitigation measures to reduce the impacts from Navy training and testing activities on marine mammal species or stocks and their habitat. During the process of developing mitigation measures, NMFS and the Navy considered all potentially applicable mitigation measures. Evaluation of past and present Navy mitigation measures, alternative mitigation measures, and mitigation measures of foreign navies is discussed in Chapter 5 of the GOA FSEIS/OEIS. As discussed in the Mitigation section, NMFS has determined that the mitigation measures required by this rule are adequate means of effecting the least practicable adverse impacts on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas

of similar significance, while also considering personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Comment 43: NRDC et al.

recommended avoidance of fish spawning grounds and of important habitat for fish species potentially vulnerable to significant behavioral change, such as wide-scale displacement within the water column or changes in breeding behavior.

Response: NMFS considered impacts to marine mammal prey species as a component of marine mammal habitat. Please see the “Marine Mammal Habitat” section of the proposed rule, which included an extensive discussion of the potential impact of the Navy’s activities on fish. In summary, long-term consequences to fish populations are not expected. Impacts to fish spawning grounds and habitat use are also considered under the Magnuson-Stevens Fishery Conservation and Management Act as it relates to Essential Fish Habitat (EFH). The effect of the Navy’s activities on threatened and endangered fish was also addressed in NMFS’ Biological Opinion, which concluded that the Navy’s activities would not reasonably be expected to reduce appreciably the likelihood of the survival and recovery of any listed fish species.

Section 5.3.1.1.11 of the GOA FSEIS/OEIS (Avoiding Marine Species Habitats and Biologically Important Areas) discusses habitat avoidance. Section 3.6 of the GOA FSEIS/OEIS (Fish) provides the effects determinations on fish. As noted in Section 3.6 of the GOA FSEIS/OEIS, the current science regarding behavioral impacts to fish from sonar is that the potential for effects within the near field (within few tens of meters of the source), intermediate, or far distances is low (Popper *et al.*, 2014). For explosives, the potential for behavioral effects is high within a few tens of meters from the source, moderate to high within intermediate distances (hundreds of meters from the source), and low within the far field (thousands of meters from the source) (Popper *et al.*, 2014). Therefore, the type of wide-scale displacement being described by the commenter is unlikely to occur based on the current state of the science.

In short, NMFS does not anticipate serious, focused, or long-term effects on any species of fish, especially in the context of their importance to marine mammal species or stocks and their habitat. Therefore, NMFS does not expect the effects of Navy activities on marine mammal prey to result in effects on feeding that would have negative

energetic impacts on individuals that would be expected to negatively affect reproductive success or survivorship. NRDC did not recommend protection of any particular areas, rendering this recommendation difficult to assess. NMFS has described in responses to other comments the practicability concerns associated with avoiding training activities during certain areas and times. When the limited likelihood of reducing adverse effects on marine mammal species or stocks is considered in combination with the practicability challenges of implementing the recommendation, NMFS finds that the measure is not warranted.

Comment 44: NRDC et al. recommended evaluating before each multi-unit exercise whether reductions in sonar use are possible, given the readiness status of the units involved.

Response: The Navy uses active sonar at the lowest practicable source level consistent with mission requirements. See Section 5.3.3.1.3 of the GOA FSEIS/OEIS (Reducing Sonar Source Levels and Total Number of Hours) for more information.

Comment 45: NRDC et al. recommended dedicated research and development of technology to reduce impacts of active acoustic sources on marine mammals.

Response: The Navy has provided a significant amount of funding for marine mammal research. For example, from 2004 to 2012, the Navy provided over \$230 million for marine species research and currently sponsors 70 percent of all U.S. research concerning the effects of human-generated sound on marine mammals and 50 percent of such research conducted worldwide. The Navy's research and development efforts have significantly improved our understanding of the effects of Navy-generated sound in the marine environment. These studies have supported the modification of acoustic criteria to more accurately assess behavioral impacts to beaked whales and the thresholds for auditory injury for all species, and the adjustment of mitigation zones to better avoid injury. In addition, Navy scientists work cooperatively with other government researchers and scientists, universities, industry, and non-governmental conservation organizations in collecting, evaluating, and modeling information on marine resources. Navy scientists work cooperatively with other government researchers and scientists, universities, industry, and nongovernmental conservation organizations in collecting, evaluating, and modeling information on marine resources. Further, the adaptive

management process required by this rule regularly considers and evaluates the development and use of new science and technologies for Navy applications. For additional information on the Navy's marine mammal monitoring efforts, see <http://www.navymarine-speciesmonitoring.us/>. For the Navy's Living Marine Resources Applied Research Program see <http://www.lmr.navy.mil>. For the Office of Naval Research's Marine Mammals and Biology Basic Research Program see <http://www.onr.navy.mil/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research-322/Marine-Mammals-Biology.aspx>.

Comment 46: NRDC et al. recommended establishment of a plan and a timetable for maximizing synthetic training in order to reduce the use of active sonar training.

Response: Section 5.3.3.1.2 of the GOA FSEIS/OEIS (Replacing Training with Simulated Activities) discusses simulated activities. As described in the GOA FSEIS/OEIS, the Navy currently uses computer simulation for training whenever possible. Computer simulation can provide familiarity and complement live training and testing; however, it cannot provide the fidelity and level of training necessary to prepare naval forces for deployment. The Navy is required to provide a ready and capable force. In doing so, the Navy must operationally test major platforms, systems, and components of these platforms and systems in realistic combat conditions before full-scale production can occur. Substituting simulation for live training and testing fails to meet the Navy's statutory requirement to properly prepare forces for national defense.

Comment 47: NRDC et al. recommended prescription of specific mitigation requirements for individual classes (or sub-classes) of testing and training activities, in order to maximize mitigation given varying sets of operational needs.

Response: The Navy and NMFS have already developed mitigation requirements by activity type. Chapter 5 of the GOA FSEIS/OEIS and the "Mitigation" section of this final rule discuss these mitigation measures. NMFS has determined that the mitigation measures contained in this rule are adequate means of effecting the least practicable adverse impacts on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, while also considering personnel safety, practicality of implementation, and

impact on the effectiveness of the military readiness activity.

Comment 48: NRDC et al. recommended timely, regular reporting to NOAA, state coastal management authorities, and the public to describe and verify use of mitigation measures during testing and training activities.

Response: NMFS has long required the Navy to submit timely, regular reports regarding the use of mitigation measures during training and testing activities. Section 3.8.5 (Summary of Observations During Previous Navy Activities) provides the results from regular reporting that has occurred since 2006. These reports are publically available at the Navy Web site (<http://www.navy-marinespeciesmonitoring.us/>) and at the NMFS Office of Protected Resources Web site (www.nmfs.noaa.gov/pr/permits/incidental/military.htm). Navy reporting requirements, including exercise and monitoring reporting, are described in the "Monitoring" and "Reporting" sections of this final rule and in Section 5.5 of the GOA FSEIS/OEIS (Monitoring and Reporting).

Comment 49: NRDC et al. and other commenters recommended that the Navy agree to additional clean-up and retrieval of discarded debris and expended materials associated with its proposed activities.

Response: The Navy conducted a full analysis of the potential impacts of military expended materials on marine mammals and will implement several mitigation measures to help avoid or reduce those impacts. As presented in the 2011 GOA Final EIS/OEIS (Section 3.2 Expended Materials), no biologically meaningful impacts related to expended materials would occur as a result of the proposed action and the way those materials are used. There are numerous studies involving the fate of expended munitions, including locations where the expended materials are much more concentrated and have been in place for many decades. Those studies do not indicate there is any significant impact on the environment or the sea life living in proximity to those materials.

The Navy has standard operating procedures in place to reduce the amount of military expended materials to the maximum extent practical, including recovering targets and associated parachutes (see Section 5.1 of the GOA FSEIS/OEIS (Standard Operating Procedures)).

Effects Analysis/Takes

Comment 50: The Commission recommended that NMFS require the Navy to request 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. Other commenters, including NRDC *et al.*, were also critical of the Navy's post-model analysis, claiming that post-model adjustments in takes resulted in underrepresented total takes. NRDC *et al.* and other commenters requested further explanation of, or more information on, the post-model reduction process. Both the Commission and NRDC *et al.* expressed concern with observer effectiveness in the Navy's development of mitigation effectiveness scores or $g(0)$ values.

Response: See Section 3.8.3.1.6 (Behavioral Reactions) of the GOA FSEIS/OEIS for the discussion of the science regarding the avoidance of sound sources by marine mammals. With regard to concerns over long term consequences, Section 3.8.3.1.3. (Long-Term Consequences to the Individual and the Population) and Section 3.8.5 (Summary of Observations During Previous Navy Activities) in the GOA FSEIS/OEIS provide a discussion on this topic and the reasons why the Navy does not expect marine mammals to abandon important habitat on a long-term or permanent basis. In addition, the Post-Model Quantitative Analysis of Animal Avoidance Behavior and Mitigation Effectiveness for GOA Training Activities Technical Report, available at <http://www.goaeis.com>, provides additional details regarding how the avoidance and mitigation factors were used and provides scientific support from peer-reviewed research. A comprehensive discussion of the Navy's quantitative analysis of acoustic impacts, including the post-model analysis to account for mitigation and avoidance, is also presented in Chapter 6 of the LOA application.

NMFS believes that the post-modeling analysis is an effective method for quantifying the implementation of mitigation measures to reduce impacts on marine mammals and the science regarding the avoidance of sound sources by marine mammals which cannot be captured within the modeling process itself, and that the resulting exposure estimates are, nevertheless, a conservative estimate of impacts on marine mammals from the Navy's proposed activities. As explained in the above-referenced documents, as part of the post-modeling analysis the Navy reduced some predicted Level A (PTS) exposures based on the potential for marine mammals to be detected and mitigation implemented, and the potential for marine mammals to avoid a sound source. Given this potential, not

taking into account some possible reduction in Level A exposures would result in a less realistic, overestimation of possible Level A harassment takes, as if there were no mitigation measures implemented. For example, with respect to mitigation effectiveness, the period of time between clearing the impact area of any non-participants or marine mammals and weapons release is on the order of minutes, making it highly unlikely that a marine mammal would enter the mitigation zone. Information provided in Section 3.8.3.1.8 (Implementing Mitigation to Reduce Sound Exposures) of the GOA FSEIS/OEIS indicates how much of a reduction each factor represents for specific activities. As explained in the documents referenced above, the adjustments move a percentage of the model predicted Level A (PTS) effects at close range to more likely behavioral effects (Level B harassment) and do not conclude that all modeled mortalities or non-PTS injuries will be avoided. This process represents peer-reviewed and accepted scientific process.

The assignment of mitigation effectiveness scores and the appropriateness of consideration of sightability using detection probability, $g(0)$, when assessing the mitigation in the quantitative analysis of acoustic impacts is discussed in the GOA FSEIS/OEIS (Section 3.8.3.1.8, Implementing Mitigation to Reduce Sound Exposures). Additionally, the activity category, mitigation zone size, and number of Lookouts are provided in the proposed rule (81 FR 9950, 9978–87; February 26, 2016) and GOA FSEIS/OEIS (Section 5, Tables 5.3–2 and 5.4–1). In addition to the information already contained within the GOA FSEIS/OEIS, the Post-Model Quantitative Analysis of Animal Avoidance Behavior and Mitigation Effectiveness for GOA Training Activities Technical Report (<http://www.goateis.com>) and Chapter 6 of the Navy's LOA application describe the process for the post-modeling analysis in further detail. There is also information on visual detection leading to the implementation of mitigation in the annual exercise reports provided to NMFS and briefed annually to NMFS and the Commission. These annual exercise reports have been made available and can be found at <http://www.navy-marine-species-monitoring.us/> in addition to <http://www.nmfs.noaa/pr/permits/incidental>.

The Navy is in the process of assessing Lookout effectiveness at detecting marine mammals during Navy exercises. Lookouts will not always be effective at avoiding impacts on all species. However, Lookouts are

expected to increase the overall likelihood that certain marine mammal species and some sea turtles will be detected at the surface of the water, when compared to the likelihood that these same species would be detected if Lookouts are not used. The continued use of Lookouts contributes to helping reduce potential impacts on these species from training and testing activities. Results from the Lookout effectiveness study will be reviewed and any recommendations for improving Lookout effectiveness will be considered at that time. In summary, NMFS and the Navy believe that consideration of marine mammal sightability and activity-specific mitigation effectiveness is appropriate in the Navy's quantitative analysis in order to provide decision makers a reasonable assessment of potential impacts from the Navy's proposed activities.

Comment 51: The Commission commented on possible errors in the take tables for Dall's and harbor porpoise provided in the Navy's GOA DSEIS/OEIS, LOA application, and Pacific Navy Marine Species Density Database GOA Technical Report (U.S. Department of the Navy, 2014) that includes the actual modeled data. The Commission suggested one possible explanation that the Navy used the behavioral response functions (BRF_1 for low-frequency cetaceans) and BRF_2 (for mid- and high-frequency cetaceans—excluding beaked whales and harbor porpoises—and pinnipeds)) from Finneran and Jenkins (2012) without updating them with the new weighted TTS thresholds.

Response: NMFS notes that the final authorized take estimates for Dall's porpoises changed slightly from what was presented in the GOA DSEIS/OEIS based on consideration of NMFS' new Guidance. However, the take estimates contained in the Navy's LOA application and GOA DSEIS/OEIS were not in error for Dall's and harbor porpoise. Most of the differences in takes between the two species can be directly tied to the differences in both species-specific densities as well as how that density was distributed within the GOA TMAA (U.S. Department of the Navy, 2014). Basically, Dall's porpoise density is higher than harbor porpoise and spread by strata over all of the GOA TMAA. Based on how acoustic impact modeling was done for the GOA TMAA (U.S. Department of the Navy, 2015), more Dall's porpoise would conceivably be exposed to sonar training events at closer range than harbor porpoise with resulting higher Dall's porpoise potential takes. Harbor porpoises on the

other hand have a documented coastal and at most a limited on shelf occurrence which is reflected in the harbor porpoise densities for the GOA TMAA (U.S. Department of the Navy, 2014). These harbor porpoise density areas are sufficiently distant from likely Navy sonar training as reflected in the modeling areas used (U.S. Department of the Navy, 2015) that only a limited number of behavioral exposures could occur.

Comment 52: The Commission recommended that NMFS require the Navy to: (1) Describe the upper limit of BRF1 and BRF2, including whether it assumed a 1-sec ping for all sources; (2) explain how 0 TTS and up to 7,000 behavioral takes were model-estimated for harbor porpoises; (3) adjust BRF1 and BRF2 with appropriate K and A parameters based on the basement parameter and the weighted TTS thresholds; and (4) recalculate its behavioral take estimates for all marine mammals exposed to acoustic sources based on those revised BRFs.

Response: The Navy has described the derivation of the BRF in Section 3.8.3.1.5 (Behavioral Responses) of the GOA FSEIS/OEIS and in Finneran and Jenkins (2012). The upper end of the BRFs (at levels approaching 100 percent probability of response) are not correlated or anchored at any TTS threshold. The values used in the BRFs are based on correlations of behavioral reactions with highest received sound pressure level from the three sources of data discussed in Finneran and Jenkins (2012). The ping lengths used within the Navy's model to assess potential impacts are representative of the different sonars and modalities and are not necessarily one second. The predicted higher order effect (*i.e.* TTS over behavioral) is what is reported in the impact analysis; however, it is important to note that both TTS and behavioral harassment are considered Level B under MMPA.

After consideration of the frequency weighting, the functional TTS threshold for high frequency cetaceans (which includes both harbor porpoise and Dall's porpoise) at 3.5 kHz is a sound exposure level of 169 dB re $1\mu\text{Pa}^2\text{-s}$. For harbor porpoises the behavioral threshold is a step function of sound pressure level 120 dB re $1\mu\text{Pa}$; the effect is predicted based on the loudest received ping regardless of individual ping duration or the number of pings received. From a SQS-53 with a nominal source level of 235 dB re $1\mu\text{Pa}$, the range to 169 dB re $1\mu\text{Pa}^2\text{-s}$ varies with ping duration and the number of pings received by an animal, but is on the order of a few kilometers. On the

other hand, the range to the 120 dB re $1\mu\text{Pa}$ behavioral threshold from a SQS-53 source can be greater than 100 km. The GOA TMAA itself, where Navy activities are modeled/analyzed, contains very low to no harbor porpoise densities (0.0000 to 0.0259 animals/ km^2) and is greater than 50 km from areas on the continental shelf that contain higher densities of harbor porpoise. Based on the range to TTS versus behavioral responses, and the fact that sonar training activities within the GOA TMAA are greater than 50 km from harbor porpoise habitat, 7,000 predicted behavioral responses and no TTS is a valid result. Behavioral response for Dall's porpoise is based on BRF₂ which predicts a decreasing probability of response to a basement level of 120 dB re $1\mu\text{Pa}$. Densities of Dall's porpoise within the TMAA are up to 0.1854 animals/ km^2 . Therefore, the sonar sources within the proposed activities would be within range to TTS for Dall's porpoise.

NMFS does not agree with the Commission that the Navy should adjust behavioral response functions based on TTS thresholds as there is no consistent correlation between sound levels known to induce hearing loss and those with a specific probability of behavioral reaction. Therefore, the take estimates in the Navy's GOA SEIS/OEIS and LOA application are correct based on species densities used, species occurrence distribution within the TMAA, and modeling results.

Comment 53: The Commission recommended that NMFS require the Navy to round its takes based on model-estimated takes to the nearest whole number or zero in all of its take tables.

Response: In April 2011 at the start of Phase II process, the Navy and NMFS (as a cooperating agency for NEPA purposes) had a meeting at NMFS headquarters and agreed to the rounding process presented in the GOA FSEIS/OEIS, and other Phase II EISs. The final modeling numbers presented in the GOA FSEIS/OEIS were rounded down at the sub-total stage so those totals in the GOA SEIS/OEIS based on the various effect criteria and the totals presented in the LOA application based on Level A and Level B harassment as grand totals would sum consistently. Specifically, all fractional post-processed exposures for a species/stock across all events within each category sub-total (Impulse and Non-Impulse) are summed to provide an annual total predicted number of effects. The options for rounding had been to round up, to round down, or to manually change the conventionally rounded numbers so that the sub-total and grand totals matched.

Given the conservative factors in the modeling (described in the GOA FSEIS/OEIS Section 3.8.3.1.6.3 (Navy Acoustic Effects Model, sub-section *Model Assumptions and Limitations*)) that produce an overestimate in the predicted effects, using the Microsoft Excel rounddown function at this final stage of number presentation was considered to be the most consistent and representative means of producing the final numbers presented in the analyses. More importantly, the differences in alternative rounding procedures would be negligible and would have no consequences related to the analysis of impacts to populations of marine mammals or the likely long term consequences resulting from the proposed action.

Comment 54: NRDC *et al.* commented that NMFS failed to properly analyze the potential for serious injury and mortality, particularly with regard to sonar-related injury and mortality (*i.e.*, strandings) during the Navy's use of mid-frequency active sources and other sources. The commenters cited several stranding events (*e.g.*, Bahamas, 2000; Washington State, 2003) that they assert occurred coincident with military mid-frequency sonar use. NRDC *et al.* commented that these events have involved beaked whales, minke whales, *kogia*, and harbor porpoises, and states that most beaked whale casualties are likely to go undetected.

Response: NMFS uses the best available science to analyze the Navy's activities. The "Stranding and Mortality" section of the proposed rule (81 FR 9950, 9970-76; February 26, 2016) summarized the stranding events referenced in NRDC *et al.*'s comment, including the association between stranding events and exposure to MFAS. Also, see the GOA FSEIS/OEIS Section 3.8.3.1.2.8 (Stranding) and the U.S. Department of the Navy (2013c) "Marine Mammal Strandings Associated with U.S. Navy Sonar Activities" technical report available at <http://www.goaeis.com>. The modeling of acoustic effects takes into consideration all applicable environmental factors and all applicable sound sources to predict the likely effects to beaked whales and all other species. Please also see Southall *et al.* (2007), Finneran and Jenkins (2012), and the GOA FSEIS/OEIS Section 3.8.3.1.4.1 (Frequency Weighting) to understand the implementation of frequency weighting as it applies to the analysis of effects from mid-frequency and high frequency sound sources.

The environmental conditions in the GOA TMAA Study Area and the types of activities proposed in the GOA

FSEIS/OEIS have no relationship to those present in the Bahamas incident fourteen years ago in unique and warm tropical waters. The environmental conditions otherwise differentiating the Atlantic tropical Bahamas environment present in 2000 from the GOA TMAA Study Area include the unique bathymetry of the Bahamas Providence Channels that are steep sided, narrow, and very deep—ranging from approximately 2,000 to 12,000 in depth. On that day in 2000 in the Bahamas, there was also a 200-meter-thick layer of near constant water temperature, calm seas, as well as the presence of beaked whales.

With regard to the harbor porpoise strandings in Washington State (2003), NMFS has since determined that these strandings were unrelated to Navy sonar use. There was a lack of evidence of any acoustic trauma among the harbor porpoises, and the identification of probable causes (*e.g.*, entanglement in a fishing net, disease processes) of stranding or death in several animals supports the conclusion that the harbor porpoise strandings were unrelated to the sonar activities by the USS SHOUP. Refer to the discussion in the “Stranding and Mortality” section of the proposed rule (81 FR 9950, 9970–79; February 26, 2016) and the GOA FSEIS/OEIS Section 3.8.3.1.2.8 (Stranding) and the U.S. Department of the Navy (2013c) “Marine Mammal Strandings Associated with U.S. Navy Sonar Activities” technical report (available at <http://www.goaeis.com>) for a discussion of other previous strandings and note that the other stranding events in this comment did not occur in, and were not associated with, the GOA TMAA Study Area and did not involve any of the training scenarios proposed for the GOA TMAA Study Area.

Lastly, while not referenced by the commenters and not related to active sonar exposure, NMFS considered an investigation into a long-finned pilot whale mass stranding event at Kyle of Durness, Scotland, on July 22, 2011 (Brownlow *et al.*, 2015). The investigation considered unexploded ordnance detonation activities at a Ministry of Defense bombing range, conducted by the Royal Navy prior to and during the strandings, as a plausible contributing factor in the mass stranding event. While Brownlow *et al.* (2015) concluded that the serial detonations of underwater ordnance were an influential factor in the mass stranding event (along with presence of a potentially compromised animal and navigational error in a topographically complex region) they also suggest that mitigation measures—which included

observations from a zodiac only and by personnel not experienced in marine mammal observation, among other deficiencies—were likely insufficient to assess if cetaceans were in the vicinity of the detonations. The authors also cite information from the Ministry of Defense indicating “an extraordinarily high level of activity” (*i.e.*, frequency and intensity of underwater explosions) on the range in the days leading up to the stranding.

The GOA FSEIS/OEIS provides an analysis of potential impacts occurring in the GOA TMAA Study Area. While most of the world’s coastlines lack coverage by a stranding network, the Navy’s analysis of impacts has focused on scientific data collected in and around the Navy range complexes, which are the proposed locations for the continuation of historically occurring training and testing activities including the use of sonar. A summary of the compendium of the research in that regard is presented in the GOA FSEIS/OEIS in Section 3.8.5 (Summary of Observations During Previous Navy Activities). Unlike the rest of the world’s oceans, there has not been an absence of observation where the U.S. Navy has been routinely training and testing for years. In particular, and as ongoing for approximately the last 8 years, the Navy, NMFS, and an independent group of scientists have been engaged in implementing a comprehensive monitoring program and associated research that includes monitoring before, during, and after Navy activities on U.S. Navy range complexes. In short, the research and monitoring associated with Navy training and testing activities makes the Navy range complexes different than the remainder of the world’s oceans.

There have been no mortalities or strandings associated with Navy sonar use during the past approximately 8 years of monitoring, but to the contrary there has been overwhelming evidence from research and monitoring indicating the continued presence or residence of individuals and populations in Navy range complexes and no clear evidence indicating long-term effects from Navy training and testing in those locations. For example, photographic records spanning more than two decades demonstrated re-sightings of individual beaked whales (from two species: Cuvier’s and Blainville’s beaked whales), suggesting long-term site fidelity to the area west of the Island of Hawaii where intensive swept-channel exercises historically occurred (McSweeney *et al.*, 2007). In the most intensively used training and testing ranges in the Pacific, photo

identification of animals associated with the SOCAL Range Complex have identified approximately 100 individual Cuvier’s beaked whale individuals with 40 percent having been seen in one or more prior years, with re-sightings up to 7 years apart (Falcone and Schorr, 2014). Data from visual surveys documenting the presence of Cuvier’s beaked whales for the ocean basin west of San Clemente Island (Falcone *et al.*, 2009; Falcone and Schorr, 2012, 2014; Smultea and Jefferson, 2014) is also consistent with concurrent results from passive acoustic monitoring that estimated regional Cuvier’s beaked whale densities were higher than indicated by NMFS’ broad scale visual surveys for the United States west coast (Hildebrand and McDonald, 2009). Falcone and Schorr (2012) suggested that these beaked whales may have population sub-units with higher than expected residency to the Navy’s instrumented Southern California Anti-Submarine Warfare Range in particular. For over three decades, this ocean area west of San Clemente has been the location of the Navy’s instrumented training range and is one of the most intensively used training and testing areas in the Pacific, given the proximity to the Naval installations in San Diego. In summary, the best available science indicates the Navy’s continued use of Navy range complexes have not precluded beaked whales from also continuing to inhabit areas where sonar use has been occurring, and there is no evidence to suggest that undocumented mortalities are occurring in the GOA TMAA or on the range complexes where the U.S. Navy routinely conducts training and testing activities.

In the GOA FSEIS/OEIS, the sensitivity of beaked whales is taken into consideration both in the application of Level B harassment thresholds and in how beaked whales are expected to avoid sonar sources at higher levels. No beaked whales were predicted in the acoustic analysis to be exposed to sound levels associated with PTS, other injury, or mortality (note: There is no data from which to develop or set a mortality criterion and there is no evidence that sonar can lead to a direct mortality due to lack of a shock wave). After years of the Navy conducting similar activities in the Study Area without incident, NMFS does not expect strandings, injury, or mortality of beaked whales or any other species to occur as a result of training activities. Additionally, through the MMPA rulemaking (which allows for adaptive management), NMFS and the Navy will determine the appropriate

way to proceed in the event that a causal relationship were to be found between Navy activities and a future stranding.

NMFS has considered the body of science regarding strandings that have occurred coincident with Naval training exercises, paying particular attention to the few instances where scientific review has concluded that the exercises may have had a causal contribution. In short, the strandings that have been more conclusively linked to Naval activities in some way have largely been associated with certain environmental and/or operational factors that the Navy has addressed through preventative monitoring measures to be implemented when the factors may be present in an operational area. In general, there seems to be a low probability that strandings could occur in any Navy training areas, and in the GOA this probability is considered discountable because none of the complicating environment factors are present, because of short duration and comparatively low volume of potential tactical sonar use, and because of the historical absence of Navy-associated strandings in the area. NMFS and the Navy have adequately considered the science on this topic and applied it to actions where appropriate.

Comment 55: NRDC *et al.* commented that NMFS dismisses the leading explanation about the mechanism of sonar-related injuries—that whales suffer from bubble growth in organs that is similar to decompression sickness, or “the bends” in human divers—as one of several controversial hypotheses. They cite numerous papers in support of this explanation.

Response: NMFS explicitly addresses acoustically mediated bubble growth in the Potential Effects section of the proposed rule. Additionally, please see the Navy’s GOA FSEIS/OEIS Section 3.8.3.1.2.1 (Direct Injury) in general and specifically Section 3.8.3.1.2.2 (Nitrogen Decompression) where the latest scientific findings have been presented. As noted above, NMFS and the Navy have reviewed the body of science on this topic and applied it, where applicable, to the proposed action.

Comment 56: Citing several references, NRDC *et al.* commented that the Navy and NMFS failed to adequately assess the impacts of stress on marine mammals.

Response: NMFS fully considered in the proposed rule the potential for physiological responses, particularly stress responses, that could potentially result from exposure to MFAS/HFAS or underwater explosive detonations (see *Stress Response* in the “Potential Effects” section of the proposed rule).

NMFS’ analysis identifies the probability of lethal responses, physical trauma, sensory impairment (permanent and temporary threshold shifts and acoustic masking), physiological responses (including stress responses), behavioral disturbance (that rises to the level of harassment), and social responses (effects to social relationships) that would be classified as a take and whether such take would have a negligible impact on such species or stocks. This analysis is included in the Analysis and Negligible Impact Determination in this final rule, and results of the analysis of physiological stress responses are summarized below. The Navy’s analysis also considered secondary and indirect impacts, including impacts from stress (see the GOA FSEIS/OEIS Section 3.8 (Marine Mammals)). See for example, Section 3.8.3.1.2.5 (Physiological Stress) presenting Rolland *et al.* (2012) and other similar research regarding chronic stressors, and Section 3.8.3.1.3 (Long-Term Consequences to the Individual and the Population). For a discussion of biotoxins, see Section 3.8.2.4 (General Threats).

The referenced studies of North Atlantic right whales (*e.g.*, Rolland *et al.*, 2012) impacted by chronic noise were cited and considered in the Navy’s and NMFS’ analysis, as well as similar studies such as Hatch *et al.* (2012) and Parks *et al.* (2007) (see Section 3.8.3.1, Acoustic Stressors in the GOA FSEIS/OEIS; see “Potential Effects of Specified Activities” on Marine Mammals in the proposed rule (81 FR 9950, 9961–78; February 26, 2016)). Similar findings for blue whales from the Pacific (Melcon *et al.*, 2012) were also considered for mysticetes, as well as similar findings for other marine mammal groups with regard to potential chronic stressors. Note, however, that these studies (and similar studies from the Pacific Northwest such as Williams *et al.* (2013)) involve chronic noise resulting from the pervasive presence of commercial vessels. The Navy activities in the GOA TMAA Study Area involving active sonar or underwater detonations are infrequent and short-term. Even though an animal’s exposure to active sonar may be more than one time, the intermittent nature of the sonar signal, its low duty cycle, and the fact that both the vessel and animal are moving provide a very small chance that exposure to active sonar for individual animals and stocks would be repeated over extended periods of time. Since the impact from noise exposure and the Navy’s training events in general should be transitory given the movement of the

participants, any stress responses should be short in duration and have less than biologically significant consequences. Consequently, NMFS has determined that the Navy’s activities in the GOA TMAA Study Area do not create conditions of chronic, continuous underwater noise and are unlikely to lead to habitat abandonment or long-term hormonal or physiological stress responses in marine mammals.

The opinion on how stress affects individuals and more importantly marine mammal stocks or populations is still under scientific review and research. The Navy via the ONR basic research program is a leading sponsor of ongoing stress related studies. These include but are not limited to: Development and Validation of a Technique for Detection of Stress and Pregnancy in Large Whales (multiple academic performers); Validating the Novel Method of Measuring Cortisol Levels in Cetacean Skin by Use of an ACTH Challenge in Bottlenose Dolphins (Aarhus University); Measuring and Validating Levels of Steroid Hormones in the Skin of Bottlenose Dolphins (*Tursiops truncatus*) (Aarhus University); Quantifying Stress in Marine Mammals: Measuring Biologically Active Cortisol in Cetaceans and Pinnipeds (University of Toronto Scarborough); Behavioral and Physiological Response of Baleen Whales to Ships and Ship Noise (multiple performers); Stress Hormones and their Regulation in a Captive Dolphin Population (National Marine Mammal Foundation); Molecular Indicators of Chronic Stress in a Model Pinniped—the Northern Elephant Seal (National Marine Mammal Foundation); Variability of Hormonal Stress Markers and Stress Responses in a Large Cross-Sectional Sample of Elephant Seals (Sonoma State University); Development of Novel Noninvasive Methods of Stress Assessment in Baleen Whales (New England Aquarium); Understanding the Onset of Health Impacts Caused by Disturbance (University of Aberdeen); Tag-based Heart Rate Measurements of Harbor Porpoises During Normal and Noise-exposed Dives to Study Stress Responses (Aarhus University); Markers of Decompression Stress of Mass Stranded/Live Caught and Released vs. Single Stranded Marine Mammals (Woods Hole Oceanographic Institution); Investigation of the Molecular Response in Blood and Skin of Belugas in Response to “Stressors” (Sea Research Foundation, Inc.); Assessing Stress Responses in Beaked and Sperm Whales in the Bahamas

(New England Aquarium/Bahamas Marine Mammal Research Organization); and Determining Baseline Stress-Related Hormone Values in Large Cetaceans (Baylor University). This body of work is ongoing and will be supplemented by new studies in future years.

NMFS and the Navy have reviewed the large body of science on this issue and summarized the more salient articles in the proposed rule and the FSEIS/OEIS. We address the known risks of stress impacts and highlight the need for more work on the subject, while acknowledging that there are no specific actions (beyond the sorts of mitigation already included) that would be expected to effectively reduce these risks.

Comment 57: NRDC *et al.* commented that the Navy would release a host of toxic chemicals, hazardous materials and waste into the marine environment that could pose a threat to marine mammals over the life of the range. They also commented that the Navy plans to abandon cables, wires, and other items including parachutes that could entangle marine wildlife.

Response: Please see the 2011 GOA FEIS/OEIS for analysis of impacts other than acoustic stressors. The GOA FEIS/OEIS analysis concluded that most of the material expended during training would be inert and degrade slowly. A small amount of chemicals would be considered hazardous—predominantly residual explosives, which break down slowly—but any small amount of leaching sediment would be dispersed quickly by the currents. The GOA FSEIS/OEIS analysis concluded that the material expended during training would not result in water or sediment toxicity, and that no adverse effects on marine organisms would be expected. Please see the GOA FSEIS/OEIS Section 3.2 (Expended Material) for details in this regard.

Comment 58: NRDC *et al.* commented that NMFS failed to evaluate and authorize vessel strike with large cetaceans or the potential harassment of harbor porpoises by vessel noise. NRDC *et al.* further commented that not only are whales at risk of being struck by Navy vessels in the normal course of activities, but also that the use of active acoustics exacerbates the potential for collision. NRDC *et al.* comments that the failure to examine the risk of ship strikes is particularly troubling given the Large Whale UME underway in the Western Gulf of Alaska.

Response: Please see Section 3.8.2.4 (General Threats) of the GOA FSEIS/OEIS for a discussion of the potential for ship strike in general. Individual

species-specific analyses in Section 3.8.2 (Affected Environment) of the FSEIS/OEIS also discuss the threat of ship strikes on a species level. To date, there has not been a Navy ship strike in the GOA over 20 years of infrequent use of the GOA TMAA. Navy ships always move at the safest practical speed based on a given training objective and schedule, operational need, and safety of navigation. The Navy has had a longstanding policy that requires ships to report any ship strikes to NMFS. With respect to the Navy's proposed activities for 2017 to 2022, there is no large increase in training activities proposed over and above historic use. Therefore, past real-world results (no strikes) is just as valid, if not more so than speculative modeling.

Navy vessels operate differently from commercial vessels in ways important to the prevention of whale collisions. Surface ships operated by or for the Navy have personnel assigned to stand watch at all times, day and night, when a ship or surfaced submarine is moving through the water (underway). A primary duty of personnel standing watch on surface ships is to detect and report all objects and disturbances sighted in the water that may indicate a threat to the vessel and its crew, such as debris, a periscope, surfaced submarine, or surface disturbance. Per vessel safety requirements, personnel standing watch also report any marine mammals sighted in the path of the vessel as a standard collision avoidance procedure. All vessels use extreme caution and proceed at a safe speed so they can take proper and effective action to avoid a collision with any sighted object or disturbance, and can be stopped within a distance appropriate to the prevailing circumstances and conditions. Further, this rule requires vessels to avoid approaching marine mammals head on and to maneuver to maintain a mitigation zone of 500 yd (457 m) around observed whales and 200 yd (183 m) around all other marine mammals (except bow-riding dolphins), providing it is safe to do so.

The research by Nowacek *et al.* (2004) cited by NRDC *et al.* is discussed in the GOA FSEIS/OEIS in the context of behavioral reactions to vessels and in the GOA FSEIS/OEIS Section 3.8.3.1.2.6 (Behavioral Reactions). Nowacek *et al.* (2004) used an alarm signal purposefully designed to provoke a response from the whales. The signal, which was long in duration, lasting several minutes, was intended to protect the whales from ship strikes. The frequency, duration, and temporal pattern of sound sources affected the whale's responses. The right whales did

not respond to playbacks of either right whale social sounds or vessel noise, highlighting the importance of the sound characteristics, species differences, and individual sensitivity in producing a behavioral reaction. Navy activities using sonar would not be used in the same way as the sound source used by Nowacek *et al.* (2004), and similar reactions occurring miles from the sound source are not anticipated.

In addition, there is no scientific basis for the suggestion that animals exposed to sonar would have "greater susceptibility to vessel strike." Navy sonar is used intermittently for short durations, and is not aimed at or designed to be an alarm signal for low frequency mysticetes or other cetaceans. Further, studies where experimental sound source are used have had an extremely different frequency, duration, and temporal pattern of signal presentation from anything used by or proposed for use by the Navy. Of note, and in contrast to the comment's assertion, an equally plausible interpretation of the study is that an active mid-frequency sound source could potentially alert marine mammals to the presence of a Navy vessel and therefore reduce the potential for ship strikes. There has never been any association with Navy sonar use and ship strikes in over 30 years of worldwide Navy ship strike reporting to NMFS. Therefore, it is erroneous to assume Navy sonar use in the GOA TMAA would increase marine mammal vulnerability to Navy ship strike. Further, there has been no indication from more frequent Navy sonar use in other areas of the Pacific outside of the GOA TMAA of significant large whale reactions such that ship strike risk would increase.

Unusual Mortality Events (see "Strandings in the GOA TMAA" in the proposed rule (81 FR 9950, 9976; February 26, 2016)) and any ship strikes that have been reported in and outside of the GOA are not from Navy activities. The 2015 GOA strandings discussed in the proposed rule may be correlated with Pacific coast wide toxic algal poisoning. The large whale UME in the GOA is still under investigation, with the causes currently listed as "undetermined, possible ecological causes."

In summary, both NMFS and the Navy fully evaluated the potential effects of ship strike. While the possibility of ship strike can never be fully ruled out where vessels are involved, the history and limited use of Navy vessels in the GOA, combined with the training, safety, and mitigation

protocols, makes the probability of a ship strike so small as to be discountable, and no ship strikes are anticipated or authorized in the final rule.

Regarding vessel noise, both NMFS and the Navy have considered, and addressed in the proposed rule and the FSEIS/OEIS, the body of science indicating that harbor porpoises are generally more sensitive to sound exposure than other species, typically avoid human activities at larger distances than other species, and have been documented responding to vessel noise. Because of this, we use a lower behavioral threshold, 120dB, to predict when harbor porpoises will be taken by Level B harassment by Navy's sound sources. We believe that this approach allows for us to fully capture the extent of meaningful effects and take of harbor porpoises resulting from Navy activities.

Comment 59: NRDC *et al.* commented that NMFS does not adequately analyze the potential for and impact of oil spills (the commenters make reference to the Exxon Valdez and Cosco Busan oil spill incidents), including the potential for collisions between Navy vessels and oil tankers.

Response: The Navy's proposed action would not transport large amounts of oil, as did those ships involved in prior spills in Alaska, or interact with the production or transportation of oil for commercial sale while training in the TMAA. Moreover, the Exxon Valdez spill occurred as a result of improper ship manning and handling, and the Cosco Busan incident that occurred in San Francisco resulted from an impaired pilot. Neither incident is connected to Navy training or testing. Nevertheless, oil spill prevention is a high priority for the Navy. Throughout its spill prevention program, the Navy concentrates on the entire spectrum of oil handling. The Navy maintains in house capability to respond to spills of all sizes. Every ship is equipped with an oil spill kit that is designed to prevent spills from entering the water. Navy activities report oil spills through the Navy chain to the National Response Center. Navy personnel are highly trained in containment and cleanup of spills and equipment is pre-staged worldwide should it be necessary. The Navy conducts periodic training with all response agencies, federal, state, and local. A search of the USCG's National Response Center Annual reports indicates that out of the countless number of reported spills in the state of Alaska, from small amounts of oil sheen to large spills, there have been very few from government vessels (predominately USCG vessels) in

Alaska. The probability of a Navy ship oil spill is extremely minimal given standard operating procedures.

Regarding the potential for collision with oil tankers, the Navy does not restrict commercial vessel traffic in the TMAA during exercises but it does publish Notices to Mariners (NTMs) prior to an exercise alerting vessels to the presence of Navy ships for the exercise. While the Navy does not publish daily NTMs, USCG District 17, Juneau, Alaska, communicates any active Navy training activity to shipping vessels through broadcast NTMs on VHF-FM Channel 16 and 22A (Navy 2016). During the exercise, consistent with standard practice for Navy training worldwide, the Navy avoids areas, to the extent practicable, with high concentrations of commercial vessels (*e.g.*, shipping lanes). The Navy has extensive experience and procedures (radar, lookouts, etc.) during training and transit in avoiding commercial vessels, fishing boats, and recreational boats. For instance, in other Pacific range areas, some of which serve as the homeport concentrations for the majority of Navy ships (*e.g.*, San Diego, Pearl Harbor), there have been no such collisions with any commercial shipping vessels. Therefore, the probability of such an incident (Navy-civilian ship strike) in the TMAA is extremely remote, further reduced by the low level of Navy activities (one exercise per year). Furthermore, the actual quantity of Navy surface ships participating in an individual GOA exercise is typically rather small (0–4). These Navy ships are present in the TMAA for only short durations up to 21-days, with shorter periods being more typical (10–14 days).

Comment 60: NRDC *et al.* commented that NMFS' analysis cannot be limited only to direct effects, *i.e.*, effects that occur at the same time and place as the training exercises that would be authorized, but must also take into account the activity's indirect effects. The commenters assert that this requirement is critical given the potential for sonar exercises to cause significant long-term impacts not clearly observable in the short term.

Response: NMFS and the Navy analyzed both direct and indirect effects from Navy training activities. A discussion of potential indirect effects may be found in the proposed rule (81 FR 9950, 9961–78; February 26, 2016) (see "Potential Effects of Specified Activities on Marine Mammals" and the "Habitat" section) and this final rule (see "Analysis and Negligible Impact Determination"). As discussed in Section 3.8.3.1.3 (Long-Term

Consequences to the Individual and the Population) of the GOA FSEIS/OEIS, the Navy's analysis also considers all potential impacts resulting from exposure to acoustic sources, including indirect effects. With respect to long-term impacts, see the discussion in Section 3.8.3.1.3 of the GOA FSEIS/OEIS (Long-Term Consequences to the Individual and the Population) and the Long-Term Consequences section of this rule. For marine mammals in particular, see the GOA FSEIS/OEIS Section 3.8.4 (Summary of Impacts (Combined Impacts of All Stressors) on Marine Mammals) and Section 3.8.5 (Summary of Observations During Previous Navy Activities), presenting the evidence collected from the intensive monitoring of Navy training and testing at range complexes nationwide since 2006 which provides support for the conclusions that it is unlikely there would be any population level or long-term consequences resulting from the proposed training activities and implementation of this final rule. The scientific authorities presented in the comment (the National Research Council) are discussed in the GOA FSEIS/OEIS, and do not support the contention that there is a link between the use of sonar and any population-level effects. For example, the number of blue whales has been increasing at 3 percent annual rate in the Southern California waters where the most frequent and intensive sonar use occurs in the Pacific (Calambokidis *et al.*, 2009a).

Comment 61: NRDC *et al.* commented that NMFS failed to adequately assess the cumulative impacts of the Navy's activities in its negligible impact determination. More specifically, see the commenters' four comments (62–65) below.

Response: Section 101(a)(5)(A) of the MMPA requires NMFS to make a determination that the take incidental to a specified activity will have a negligible impact on the affected species or stocks of marine mammals, and will not result in an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses. Neither the MMPA nor NMFS' implementing regulations specify how to consider other activities and their impacts on the same populations. However, consistent with the preamble for NMFS' implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into the negligible impact analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the density/distribution and

status of the species, population size and growth rate, and ambient noise).

As discussed in the “Analysis and Negligible Impact Determination” section of this final rule, Chapter 4 of the GOA FSEIS/OEIS contains a comprehensive assessment of potential cumulative impacts, including analyzing the potential for cumulatively significant impacts to the marine environment and marine mammals. The Navy used the best available science and a comprehensive review of past, present, and reasonably foreseeable actions to develop a robust cumulative impacts analysis. The cumulative impacts analysis focused on impacts that are “truly meaningful.” This was accomplished by reviewing the direct and indirect impacts that have the potential to occur on each resource under each of the alternatives. Key factors considered were the current status and sensitivity of the resource and the intensity, duration, and spatial extent of the impacts of each potential stressor. In general, long-term rather than short-term impacts and widespread rather than localized impacts were considered more likely to contribute to cumulative impacts. As required under NEPA, the level and scope of the analysis are commensurate with the potential impacts of the action as reflected in the resource-specific discussions in Chapter 3 of the GOA FSEIS/OEIS. The GOA FSEIS/OEIS considered its activities alongside those of other activities in the region whose impacts are truly meaningful to the analysis.

In addition, NMFS’ Biological Opinion concludes that NMFS’ proposed rulemaking and LOA and any take associated with activities authorized by the rulemaking and LOA are not likely to jeopardize the continued existence of threatened or endangered species (or species proposed for listing) in the action area during any single year or as a result of the cumulative impacts of a 5-year authorization.

Comment 62: NRDC *et al.* assert that there is a lack of any population analysis or quantitative assessment of long-term effects in the proposed rule.

Response: NMFS and the Navy fully considered potential long-term and population-level effects. Analysis of these effects is presented in the GOA FSEIS/OEIS in Section 3.8.3.1.3 (Long-Term Consequences to the Individual and the Population) and in the “Analysis and Negligible Impact Determination” section in this final rule (see *Long-Term Consequences* and *Final Determination* sections). NMFS’ assessment is that the Navy training

activities involving active sonar or underwater detonations are infrequent and short-term (as a reminder, the GOA TMAA training activities will not occur continuously throughout the year, but rather, for a maximum of 21 days annually). Consequently, the Navy’s activities do not create conditions of chronic, continuous underwater noise and are unlikely to lead to habitat abandonment or long-term hormonal or physiological stress responses in marine mammals. Based on the findings from research efforts and monitoring before, during, and after training and testing events across the Navy since 2006, NMFS’ assessment is that it is unlikely there would be impacts to populations of marine mammals having any long-term consequences as a result of the proposed continuation of training and testing in the ocean areas historically used by the Navy, including the GOA TMAA Study Area. NMFS concludes that exposures to marine mammal species and stocks due to GOA training activities would result in primarily short-term (temporary and short in duration) and relatively infrequent Level B harassment of most individuals exposed, and not of the type or severity that would be expected to be additive for the portion of the stocks and species likely to be exposed. Level A harassment, of a small degree, could be incurred by no more than 4 Dall’s porpoise.

Additionally, NMFS notes that, even in areas where the Navy uses sonar frequently, such as instrumented ranges, marine mammal populations are present, not diminishing, and in some cases, thriving. NMFS and the Navy relied on actual trends in marine mammal populations and the best available science regarding marine mammals, including behavioral response studies and the satellite tracking of tagged marine mammals in areas of higher sonar use.

NMFS has reporting and monitoring data from the Navy on training and testing events occurring around the U.S. since 2006. For example, results from 2 years (2009–2010) of intensive monitoring by independent scientists and Navy observers in Southern California Range Complex and Hawaii Range Complex recorded an estimated 161,894 marine mammals with no evidence of distress or unusual behavior observed during Navy activities. Additional information and data summarized in the GOA FSEIS/OEIS Section 3.8.5 (Summary of Observations During Previous Navy Activities) provide support for the conclusions that it is unlikely there would be any population level or long-term

consequences resulting from implementation of this final rule.

Comment 63: NRDC *et al.* commented that NMFS does not consider the potential for acute synergistic effects from multiple Navy activities taking place at one time, or from Navy activities in combination with other actions. As an example, the commenters state that NMFS does not consider the greater susceptibility to vessel strike of animals that have been temporarily harassed or disoriented. The commenters cite a Nowacek *et al.* (2004) study in which exposure to a mid-frequency sound source provoked interruption of foraging dives and the surfacing of five North Atlantic right whales and presumably increased risk of vessel strike.

Response: As presented in the GOA FSEIS/OEIS Section 3.8.3.1.4.2 (Summation of Energy from Multiple Sources) the Navy’s and NMFS’ analysis and acoustic impact modeling does consider and quantify the potential for additive effects from multiple activities involving acoustic stressors. Unlike the method used previously that modeled acoustic sources individually, the Navy’s acoustic effects model (NAEMO) has the capability to run all sound sources within a scenario simultaneously, which accounts for accumulative sound and provides a more realistic depiction of the additive effects from using multiple acoustic sources in spatial and temporal proximity (*i.e.*, the cumulative SEL is a composite of all sources received by the animal) (See Section 3.8.3.1.6.3 (Navy Acoustic Effects Model) of the GOA FSEIS/OEIS). Additionally, Section 3.8.3.1.7 (Marine Mammal Avoidance of Sound Exposures) and the following sub-sections of the GOA FSEIS/OEIS consider likely marine mammal behavior in the analysis of impacts.

In addition, and as explained in response to a previous comment above, there is no scientific basis for the suggestion that animals taken by harassment would have “greater susceptibility to vessel strike.” NMFS considered Nowacek *et al.* (2004), cited by the commenters, which is discussed in the GOA FSEIS/OEIS (Section 3.8.3.1.2.6, Behavioral Reactions). Nowacek *et al.* (2004) used an alarm signal purposefully designed to provoke a response from the whales. The signal, which was long in duration, lasting several minutes, was intended to protect the whales from ship strikes. The frequency, duration, and temporal pattern of sound sources affected the whale’s responses. The right whales did not respond to playbacks of either right whale social sounds or vessel noise,

highlighting the importance of the sound characteristics, species differences, and individual sensitivity in producing a behavioral reaction. Navy activities using sonar would not be used in the same way as the sound source used by Nowacek *et al.* (2004), and similar reactions occurring miles from the sound source are not anticipated. Of note, and in contrast to the comment's assertion, an equally plausible interpretation of the study is that an active mid-frequency sound source could potentially alert marine mammals to the presence of a Navy vessel and therefore reduce the potential for ship strikes.

Comment 64: NRDC *et al.* commented that the proposed rule makes no attempt to analyze the cumulative and synergistic effects of mortality, injury, masking, energetic costs, stress, hearing loss, or any mechanism of cumulative impact, whether for its proposed training or for its training combined with other activities affecting the same marine mammal species and populations; and NMFS makes no attempt to incorporate the effects of reasonably foreseeable activities impacting the same species and populations into its impact analysis.

Response: Noting our response to Comment 63 regarding the cumulative effects of the Navy activity in combination with other activities, please see the Analysis and Negligible Impact Determination section of this final rule, which addresses all of the combined anticipated impacts from the Navy's GOA activities. Also, see Chapter 4 (Cumulative Impacts) of the GOA FSEIS/OEIS and the response above regarding assessing the impacts of stress on marine mammals. In particular, and to understand the potential for population-level impact, see Section 3.8.5 (Summary of Observations During Previous Navy Activities) of the GOA FSEIS/OEIS. For masking effects see the discussion in Section 3.8.3.1.2.4 (Auditory Masking), and for energetic models, foraging, chronic noise and stress, see the discussion in 3.8.3.1.2.5 (Physiological Stress) in the GOA FSEIS/OEIS. The proposed actions are very limited in time and space and will not constitute "chronic noise and stress" analogous or comparable to the citations presented in the comment involving commercial shipping, seismic surveys, or whale watching.

The Navy's acoustic impact modeling does consider and quantify the potential for additive effects from multiple activities involving acoustic stressors by modeling all sound sources within a scenario simultaneously, which accounts for accumulative sound and

provides a more realistic depiction of the potential effects of an activity. Further, as explained throughout this rule, NMFS' assessment is that the cumulative impacts of active sonar would be extremely small because the exercises would occur for relatively short periods of time; the sources of active sonar would most often not be stationary; and the effects of any LF/MFAS/HFAS exposure would stop when transmissions stop. Additionally, the vast majority of impacts expected from sonar exposure and underwater detonations are behavioral in nature, temporary and comparatively short in duration, relatively infrequent, and not of the type or severity that would be expected to be additive for the portion of the stocks and species likely to be exposed. NMFS' final rule is specifically designed to reduce the effects of the Navy's activity on marine mammal species and stocks to the least practicable impact, through the inclusion of appropriate mitigation and monitoring measures, and the issuance of an Authorization with those conditions does not result in significant cumulative impacts when considered with all other past, present, and reasonably foreseeable projects.

Chapter 4 of the GOA FSEIS/OEIS contains a comprehensive assessment of potential cumulative impacts, including analyzing the potential for cumulatively significant impacts to the marine environment and marine mammals. Specifically, the Navy concluded, and NMFS concurs, that its proposed action is likely to result in generally no more than temporary changes to the noise environment and sediment and water quality. Therefore, there is limited potential for those effects to interact cumulatively with the effects of other past, present, and reasonably foreseeable projects. Implementation of the proposed action, in conjunction with other past, present, and reasonably foreseeable future actions, would not be expected to result in significant cumulative impacts to the environment. As such, the proposed action will not result in cumulative adverse effects that could have a substantial effect on species and populations in the action area.

In addition, we note that the Navy has been training in the same relative area for years using substantially similar training systems, and coupled with the multitude of other activities taking place in the area, there is no evidence of long term consequences to marine mammal populations or stocks.

Comment 65: NRDC *et al.* commented that NMFS must account for the additive impact of its activities in light

of entanglement, harmful algal blooms, and changing ocean conditions.

Response: Please see the response above to comments 61–64 regarding how NMFS and the Navy have considered cumulative effects, such as those from entanglements, algal blooms, or other stressors resulting from actions other than the Navy's training. NMFS and the Navy have considered changing ocean conditions. As discussed in the GOA FSEIS/OEIS Section 3.4 (Marine Mammals), NMFS and the Navy are aware that marine mammals will shift their habitat based on changing ocean conditions. Please see specifically Section 3.8.2.5 (Marine Mammal Density Estimates) of the GOA FSEIS/OEIS discussing the integration of habitat modeling into the analysis; also see the Navy's Pacific Marine Species Density Database Technical Report. The predictive habitat models reflect the interannual variability and associated redistribution of marine mammals as a result of changing environmental conditions during the survey years used to develop the models. The analysis presented in the Navy's Pacific Marine Species Density Database Technical Report includes density data for periods of warmer water and potentially shifting ranges of marine mammals as a result of those conditions.

While climate change may result in changes in the distribution of marine mammals, it is currently not possible to predict how or under what conditions such changes might occur without engaging in unsupported conjecture. Therefore, it is not possible to reasonably determine what hypothetical future marine mammal distributions may look like as a result of climate change or otherwise factor such changes into an analysis of resulting potential effects and impacts from Navy activities.

Comment 66: NRDC *et al.* commented that the proposed rule does not adequately assess impacts to EFH and other habitat, fish, and other prey species. NRDC *et al.* also commented that the proposed rule is inconsistent with NMFS' findings in its Magnuson-Stevens Fishery Conservation and Management Act (MSA) consultation with the Navy.

Response: The commenters refer to the Navy's analysis of potential impacts to fish and EFH contained in the GOA 2011 FEIS/OEIS. It is important to note that the analysis referred to was conducted in the context of the MSA, the ESA, and Executive Order 12114. The factors used to assess the significance of effects vary under these Acts, and are also different from those applied to the MMPA's effects analysis. The purpose of this comment period

was for the public to provide comments on the proposed rule, which is being promulgated under the authority of the MMPA. NMFS fully considered impacts to fish and other prey species as a component of marine mammal habitat. Please see the “Marine Mammal Habitat” section of the proposed rule (81 FR 9950, 10000–03; February 26, 2016), which included an extensive discussion of the potential impact of the Navy’s activities on fish and invertebrates. Potential impacts to marine mammal food resources within the GOA TMAA are negligible given both the lack of hearing sensitivity to mid-frequency sonar, the very limited spatial and temporal scope of most Navy activities at sea including underwater detonations, and the high biological productivity of these resources. NMFS concludes that no short- or long-term effects to marine mammal food resources from Navy activities are anticipated within the GOA TMAA. The effect of the Navy’s activities on threatened and endangered fish was also addressed in NMFS’ Biological Opinion, which concluded that the Navy’s activities would not reasonably be expected to reduce appreciably the likelihood of the survival and recovery of any listed fish species.

Section 5.3.1.1.11 of the GOA FSEIS/OEIS (Avoiding Marine Species Habitats and Biologically Important Areas) discusses habitat avoidance. Section 3.6 of the GOA FSEIS/OEIS (Fish) provides the effects determinations on fish. As noted in Chapter 3.6 of the GOA FSEIS/OEIS, the current science regarding behavioral impacts to fish from sonar is that the potential for effects within the near field (within few tens of meters of the source), intermediate, or far distances is low (Popper *et al.*, 2014). For explosives, the potential for behavioral effects is high within a few tens of meters from the source, moderate to high within intermediate distances (100s of meters from the source), and low within the far field (thousands of meters from the source) (Popper *et al.*, 2014).

As described in the GOA FSEIS/OEIS, there is updated information such as fish stock assessment reports and information on fish hearing since the publication of the 2011 FEIS/OEIS. However, upon a comprehensive review of this new information, there are no changes to the affected environment (*e.g.* species present) or to the impact conclusions, which forms the environmental baseline of the fish analysis in the 2011 GOA FEIS/OEIS. Instead, a review of best available science on fish hearing indicates that most species are less likely to be

affected than previously thought. The Navy and NMFS reviewed Popper *et al.* (2014) and other sources of best available science in the fall of 2015 and determined sonar and explosive criteria for fishes based on taxonomy which represents all fish species including salmon (refer to “Navy’s Northwest Training and Testing Phase II Sonar and Explosive Criteria for Fishes” in the NWTTC FEIS/OEIS). In summary, salmon and the majority of other fish species cannot hear mid-frequency sonar and therefore would not elicit a behavioral response. For fish species that can hear mid-frequency sonar, such as herring, a recent study concluded that the use of naval sonar poses little to no risk to populations of herring regardless of season, even when an entire population is aggregated during sonar exposure (Sivle *et al.*, 2015). Therefore, effects from sonar are not likely to any fish species, even those who have the ability to hear mid-frequency sonar. Sonar has not been known to cause mortality, mortal injury, or recoverable injury in the wild due to lack of fast rise times, lack of high peak pressures, and lack of high acoustic impulse. In addition, the potential for exposure to high levels is unlikely due to the very small area of effect around the source, and the inability for individuals or schools of fish to remain in that zone of effect while simultaneously maintaining a swim speed that can match ship speed for a long enough duration of time to accumulate energy. Effects from explosives are limited to the surface waters and the area in the immediate vicinity of the explosion. Deep water fish would not be affected based on their distance from the source and the lack of a developed swim bladder. No spawning areas or early life stages would be affected as they are not located in or near the TMAA. Finally, effects to habitat from temporal sound does not render the habitat unsuitable to support fish populations. In conclusion, the small scale of the potential effects on fish (including disturbance, injury, or mortality) are not expected to have any meaningful impact on the ability of marine mammals to acquire the prey that they need or fish populations in general.

Negligible Impact Determination and Analysis

Comment 67: NRDC *et al.* commented that NMFS should set the following research priorities with the Navy to address data gaps and to better inform its analysis and negligible impact determination: (1) Increased data collection and survey efforts to derive abundance estimates and improve

knowledge on year-round and seasonal distribution; (2) research into sonar signal modifications; (3) thermal detection systems; and (4) research on Navy ship speeds during transit.

Response: Increased data collection and survey efforts—NMFS relied on the best available science to make all required findings under the MMPA prior to issuing an incidental take authorization to the Navy for training activities in the GOA TMAA. To be supportive of NMFS’ mission, the Navy funded two previous GOA surveys, a visual line transect survey in 2009, and a visual and passive acoustic line-transect survey in 2013 (estimated cost \$1.1 million for 2013 survey). With only 3-years between surveys (2009, 2013), this periodicity is more frequent than what NMFS schedules for almost any other area of the Pacific having equal limited data at present.

Visual line-transect surveys using medium to large oceanographic vessels is the current scientific gold standard promoted by NMFS for deriving marine mammal density. Successive data collection from these vessels is highly dependent on sea state with limited sightings available during higher sea states. This limitation means bad weather, a significant potential anytime in the offshore waters of GOA, can seriously degrade the amount of data collected. For instance, the 2013 GOA line-transect survey was scheduled in July, the most optimum at-sea time in which to survey the GOA. However, only 59 percent (4,504) of the proposed pre-survey proposed tracks (7,644 km) could be realized. Additional future vessel use for visual surveys and towed passive acoustic surveys would likely have similar limitations.

The Navy-funded 2013 GOA survey provided the most current scientific sighting and density data available for GOA marine mammals. Over 164,953 km² of GOA were surveyed including strata reflecting specific oceanographic and biological regimes (shelf, slope, offshore, and seamounts). The strata development and sampling design presented by Rone *et al.* (2014) was generated and approved by NMFS’ Alaska Fisheries Science Center. The scale of strata is representative of how NMFS designs all large area surveys to balance scientific need and at-sea survey costs as compared to available funding. Similar spatial survey scales are found in almost all NMFS offshore visual line-transect surveys for the Atlantic and Pacific Oceans. In fact, Rone *et al.* (2014) was more novel than many NMFS surveys in use of four unique biogeographic areas within the GOA. Given the large ranges that

constitute most offshore marine mammal distributions at daily, seasonal, and between year intervals, very small scale surveys and associated density estimation could conceivably: (a) Not provide enough species-specific sightings over a given survey or even a group of similar surveys that meet the statistical requirements for deriving density, and: (b) May not adequately represent a given species' total range. In general, visual or passive acoustic detection of some individuals of a species in one area does not necessarily preclude that all individuals or even a substantial part of a stock or species use the same small geographic area. During the survey, there were 964 visual detections of 2,266 individual marine mammals from 13 species. In addition, there were 345 passive acoustic detections of marine mammals from nine species. This sighting data from the 2013 survey was used to update marine mammal density by strata for those animals with sufficient sightings from which a statistically valid calculation could be determined (seven species). Densities derived from these sightings were in turn used in the Navy's impact assessment for GOA training.

The Navy has already funded over \$2.6 million in new marine mammal monitoring within the GOA from 2011–2015. This included a 2013 visual line-transect and passive acoustic survey, up to five long-term (365 days/year) bottom-mounted passive acoustic devices on the shelf, slope, and seamounts, and a slope deployment of an underwater glider with passive acoustic sensors. The bottom-mounted devices deployed year-round have contributed valuable new science as to the occurrence and seasonality of GOA marine mammals, including blue whales, fin whales, gray whales, humpback whales, sperm whales, and beaked whales. To date, over 58,953 hours or 2,456 days' worth of passive acoustic data over all seasons have been collected, analyzed, and results reported through annual monitoring reports.

The Navy and NMFS believe that marine mammal density estimation from passive acoustic monitoring data is a promising field, which is why the Navy is a leader in funding new research to advance the state of the science. The Office of Naval Research (ONR) and the Living Marine Resources (LMR) program are currently funding multiple projects focused on the development and validation of statistical tools and analysis processes. To date, this field is very much in its infancy, and there are a number of unresolved issues that the current research is working to address. For

example, the current Navy-funded research is focusing on aspects such as the proper characterization of calling rates, range of detection, and group size, all of which can vary by species, region, time of year/day, sex, etc. All of these variables can impact the resulting density estimate, and therefore the method of incorporating these variables needs to be investigated further. Once these methods are further developed and validated, marine mammal density estimation from passive acoustic monitoring data will be a promising tool to help characterize population abundance and distribution. Therefore, with few exceptions, universal density derivation from additional passive acoustic monitoring in the GOA over the next 3–5 years is premature given the science underlying this protocol is still in development.

The Navy currently has an ongoing satellite tagging project for blue and fin whales on the US West Coast (2014–2017). These are long-term tags reporting individual movement for a period of several weeks in a worst case scenario, and up to a year in a best case scenario. These are highly mobile species that could conceivably move through portions of the GOA TMAA and if applicable, those results will be highlighted in the Navy's future GOA monitoring reports. There has already been non-Navy funded satellite tagging of select Gulf of Alaska species separate and unrelated to Navy funded monitoring in the same region. Pacific Life Foundation funded the Marine Mammal Institute of Oregon State University to attach long-term satellite tracking tags to humpback whales adjacent to the Gulf of Alaska from 2014 to 2015. To date, 40 animals have been tagged and results are currently under analysis. Tagged humpback whales have been successfully tracked whales across the Gulf of Alaska to winter reproductive areas around Hawaii and through more coastal routes along the eastern North Pacific (including the Gulf) to the tip of Baja and nearshore regions off mainland Mexico.

See the "Monitoring" section of this final rule for more information on monitoring activities planned for 2017 to 2022. Through the adaptive management process, NMFS and Navy will work together to define future GOA TMAA monitoring in consideration of achievable scientific objectives, and in terms of logistical considerations including but not limited to funding availability, applicability of one technology in GOA vs. another, and other Navy monitoring commitments in other regions of the Pacific.

Sonar signal modifications—The Navy's suite of sonar systems have been designed and optimized for submarine and mine detection over 50 years of research and actual application. Individual signal characteristics are used because they are proven to work, otherwise the system would not be in use and would hamper Navy's effectiveness in capabilities to find and locate adversary submarines and to also protect Navy ships and submarines. Unwarranted signal modifications are impractical to implement, and would not allow the Navy to meet its Title 10 national defense obligations.

Thermal detection systems—The German Federal Ministry of Education and Research funded initial development of a cryogenically cooled thermal imaging device mounted on a stabilized gimbal and associated computer software (designed and built by Ocean Acoustics Lab, Alfred Wegener Institute Helmholtz-Zentrum for Polar and Marine Research and University of Erlangen-Nuremberg, Erlangen, Germany). The camera and detection software was initially field tested in the Arctic and Southern Ocean (Zitterbart *et al.*, 2013). In a follow-on project, the Navy's Office of Naval Research has continued funding development, at-sea testing and validation of this system from 2014–2016 in temperate waters off Australia and tropical waters off Hawaii. However, this system is still in an intermediate stage of development and not ready for a full-fledged sea trial of the commercially available stand-alone system. In addition, costs just for the camera system itself are still exceedingly large, on the order of \$980,000, making the system better suited for future monitoring applications.

Integration of a non-Navy designed system into the sensor suite of a modern Navy ship is not a trivial task, and given the complexity of this or similar thermal imaging systems, would not be practical as a Navy surface ship mitigation. There are issues of quantity available to account for the several hundred Navy ships stationed in the Pacific, the overall costs for that many units, the concerns with lifecycle maintenance and upkeep with a system on ships deployed for long periods of time, ability to keep spare parts and critical components in stock and supplied as needed, and the issue of electromagnetic interference and engineering considerations when any new technology is proposed for a Navy ship. Some new technologies can take five to ten years to resolve all these issues, and in some cases may never be safely or

logistically integrated for just some of the above considerations.

Navy ship speeds during transit—To date, there has not been a Navy ship strike in the GOA over 20 years of infrequent use of the GOA TMAA. Navy ships always move at the safest practical speed based on a given training objective and schedule, operational need, and safety of navigation. Navy ships are required to report ship strikes to NMFS. Slow speeds are just as likely as and more probable than high speed maneuvers by surface vessels in many of the exercise event scenarios.

Vessel operators need to be able to react to changing tactical situations and evaluate system capabilities in training as they would in actual combat. Widespread speed restrictions would not allow the Navy to properly test vessel capabilities or train to react to these situations. Speed restrictions during some activities (e.g., flight operations, underway replenishment, etc.) would also add unacceptable risk and decrease safety of personnel and vessels.

Collection of Navy ship speed data would not inform or improve the GOA FSEIS/OEIS analysis or NMFS' negligible impact determination for the GOA TMAA given the relative different speeds of vessels depending on activities and the lack of such impacts in the past that would suggest ship strikes are reasonably likely to occur.

Navy vessels operate differently from commercial vessels in ways important to the prevention of whale collisions. Surface ships operated by or for the Navy have personnel assigned to stand watch at all times, day and night, when a ship or surfaced submarine is moving through the water (underway). A primary duty of personnel standing watch on surface ships is to detect and report all objects and disturbances sighted in the water that may indicate a threat to the vessel and its crew, such as debris, a periscope, surfaced submarine, or surface disturbance. Per vessel safety requirements, personnel standing watch also report any marine mammals sighted in the path of the vessel as a standard collision avoidance procedure. All vessels use extreme caution and proceed at a safe speed so they can take proper and effective action to avoid a collision with any sighted object or disturbance, and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

Comment 68: NRDC comments that our negligible impact determination is unsupported because of the lack of abundance data for certain species,

including minke whales, sperm whales, and several species of beaked whales.

Response: NMFS is responsible for making a finding based on the best available science. The lack of recent abundance data for the species identified by the commenters does not preclude us from making the necessary findings for these species. As described in the Analysis and Negligible Impact Determination section, the nature and duration of the activities, combined with the mitigation requirements, are such that we anticipate only short-term and lower-level Level B harassment of the affected individuals. In short, there is very little likelihood that any individuals will suffer fitness-level effects that threaten their reproductive success or survivorship. Because of the anticipated lack of fitness-level effects to any individuals, species or stock abundance is less of a factor in the analysis of population-level effects. Nonetheless, information has been added to the negligible impact analysis section that describes the abundance information we do have for species without recent abundance estimates, which allows for at least a broad-scale relative understanding of abundance.

NEPA

Comment 69: NRDC *et al.* commented that NMFS cannot rely on adoption of the Navy's GOA FSEIS/OEIS to fulfill its obligation under NEPA due to the inadequacy of the document.

Response: NMFS disagrees with the commenters' assertion that the GOA FSEIS/OEIS is inadequate for our adoption and to meet our responsibilities under NEPA for the issuance of regulations and LOA, or that NMFS has not fulfilled its NEPA obligations. NMFS notes that comments submitted on the GOA DSEIS/OEIS during its public comment period are addressed by the Navy in Appendix D of the GOA FSEIS/OEIS.

NMFS' Office of Protected Resources has thoroughly reviewed the Navy's GOA FSEIS/OEIS and concluded that the impacts evaluated by the Navy are substantially the same as the impacts of NMFS' proposed action to issue regulations (and associated LOA) governing the take of marine mammals incidental to Navy training activities in the GOA TMAA Study Area from May 2017 through May 2022. In addition, the Office of Protected Resources has evaluated the GOA FSEIS/OEIS and found that it includes all required components for adoption by NOAA including: A discussion of the purpose and need for the action; a listing of the alternatives to the proposed action; a description of the affected environment;

a succinct description of the environmental impacts of the proposed action and alternatives, including cumulative impacts; and a listing of agencies and persons consulted, and to whom copies of the GOA FSEIS/OEIS are sent.

Per the cooperating agency commitment, the Navy provided NMFS with early preliminary drafts of the GOA DSEIS/OEIS and the FSEIS/OEIS and a designated (and adequate) timeframe within which NMFS could provide comments. The Office of Protected Resources circulated the Navy's preliminary NEPA documents to other interested NOAA line offices and NMFS' regional and science center offices, compiled any comments received, and submitted them to the Navy. Subsequently, the Navy and NMFS participated in comment resolution meetings, in which the Navy addressed NMFS' comments, and in which any outstanding issues were resolved. The Navy has incorporated the majority of NMFS' comments into the GOA FSEIS/OEIS, and adequately addressed those comments that were not incorporated. As a result of this review, the Office of Protected Resources has determined that it is not necessary to prepare a separate Environmental Assessment or EIS to issue regulations or LOA authorizing the incidental take of marine mammals pursuant to the MMPA, and that adoption of the Navy's GOA FSEIS/OEIS is appropriate. Based on NMFS' review of the FSEIS, NMFS has adopted the FSEIS under the Council on Environmental Quality's Regulations for Implementing the National Environmental Policy Act (40 CFR 1506.3). Furthermore, in accordance with NEPA, its implementing regulations, and the NOAA's Administrative Order (NAO) 216-6A and Companion Manual, we have prepared a Record of Decision (ROD) which addresses NMFS' determination to issue regulations and LOA to the Navy pursuant to section 101(a)(5)(A) of the MMPA, for the taking of marine mammals incidental to the conduct of the Navy's training activities.

Estimated Take of Marine Mammals

In the "Estimated Take of Marine Mammals" section of the proposed rule, NMFS described the potential effects to marine mammals from active sonar and underwater detonations in relation to the MMPA regulatory definitions of Level A and Level B harassment (81 FR 9950, 9992-97; February 26, 2016). Much of that information has not changed and is not repeated here; however, two changes to the input into take estimates have occurred and are

described both in the “Summary of Request” and the “Take Request” immediately below.

It is important to note that, as Level B harassment is interpreted here and quantified by the behavioral thresholds described below, the fact that a single behavioral pattern (of unspecified duration) is abandoned or significantly altered and classified as a Level B harassment take does not mean, necessarily, that the fitness of the harassed individual is affected either at all or significantly, or that, for example, a preferred habitat area is abandoned. Further analysis of context and duration

of likely exposures and effects is necessary to determine the impacts of the estimated effects on individuals and how those may translate to population-level impacts, and is included in the Analysis and Negligible Impact Determination.

Tables 7 and 8 provide a summary of non-impulsive and impulsive thresholds to TTS and PTS for marine mammals, reflecting the acoustic thresholds used by the Navy for its acoustic effects model (NAEMO) in the Navy’s FEIS/OEIS and reflected in the proposed rule. Behavioral thresholds for impulsive sources are summarized in

Table 9. A detailed explanation of how these thresholds were derived is provided in the Criteria and Thresholds Technical Report (Finneran and Jenkins, 2012) and summarized in Chapter 6 of the LOA application (<http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>). As described in detail elsewhere, NMFS’ new Acoustic Guidance, and the associated thresholds (http://www.nmfs.noaa.gov/pr/acoustics/Acoustic%20Guidance%20Files/opr-55_acoustic_guidance_tech_memo.pdf) have also been considered in this final rule.

TABLE 7—ONSET TTS AND PTS THRESHOLDS FOR NON-IMPULSE SOUND

Group	Species	Onset TTS	Onset PTS
Low-Frequency Cetaceans	All mysticetes	178 dB re 1µPa2-sec(LF _{II}).	198 dB re 1µPa2-sec(LF _{II}).
Mid-Frequency Cetaceans	Most delphinids, beaked whales, medium and large toothed whales.	178 dB re 1µPa2-sec(MF _{II}).	198 dB re 1µPa2-sec(MF _{II}).
High-Frequency Cetaceans	Porpoises, <i>Kogia</i> spp	152 dB re 1µPa2-sec(HF _{II}).	172 dB re 1µPa2-secSEL (HF _{II}).
Phocidae In-water	Harbor, Hawaiian monk, elephant seals	183 dB re 1µPa2-sec(P _{WI}).	197 dB re 1µPa2-sec(P _{WI}).
Otariidae & Obodenidae In-water	Sea lions and fur seals	206 dB re 1µPa2-sec(O _{WI}).	220 dB re 1µPa2-sec(O _{WI}).
Mustelidae In-water	Sea otters.		

LF_{II}, MF_{II}, HF_{II}: New compound Type II weighting functions; P_{WI}, O_{WI}: Original Type I (Southall *et al.*, 2007) for pinniped and mustelid in water.

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Table 8. Impulsive sound explosive criteria and thresholds for predicting injury and mortality.

Group	Species	Onset TTS	Onset PTS	Onset Slight GI Tract Injury	Onset Slight Lung Injury	Onset Mortality
Low Frequency Cetaceans	All mysticetes	172 dB re 1 $\mu\text{Pa}^2\text{-s}$ SEL (Type II weighting) or 224 dB re 1 μPa Peak SPL (unweighted)	187 dB re 1 $\mu\text{Pa}^2\text{-s}$ SEL (Type II weighting) or 230 dB re 1 μPa Peak SPL (unweighted)	237 dB re 1 μPa (unweighted)	Note 1	Note 2
Mid-Frequency Cetaceans	Most delphinids, medium and large toothed whales	172 dB re 1 $\mu\text{Pa}^2\text{-s}$ SEL (Type II weighting) or 224 dB re 1 μPa Peak SPL (unweighted)	187 dB re 1 $\mu\text{Pa}^2\text{-s}$ SEL (Type II weighting) or 230 dB re 1 μPa Peak SPL (unweighted)			
High Frequency Cetaceans	Porpoises and <i>Kogia</i> spp.	146 dB re 1 $\mu\text{Pa}^2\text{-s}$ SEL (Type II weighting) or 195 dB re 1 μPa Peak SPL (unweighted)	161 dB re 1 $\mu\text{Pa}^2\text{-s}$ SEL (Type II weighting) or 201 dB re 1 μPa Peak SPL (unweighted)			
Phocidae	Northern elephant seal and harbor seal	177 dB re 1 $\mu\text{Pa}^2\text{-s}$ (Type I weighting) or 212 dB re 1 μPa Peak SPL (unweighted)	192 dB re 1 $\mu\text{Pa}^2\text{-s}$ (Type I weighting) or 218 dB re 1 μPa Peak SPL (unweighted)			
Otariidae	Steller and California Sea Lion, Guadalupe and Northern fur seal	200 dB re 1 $\mu\text{Pa}^2\text{-s}$ (Type I weighting) or 212 dB re 1 μPa Peak SPL (unweighted)	215 dB re 1 $\mu\text{Pa}^2\text{-s}$ (Type I weighting) or 218 dB re 1 μPa Peak SPL (unweighted)			
Mustelidae	Sea Otter					
Note 1	$= 39.1M^{1/3} \left(1 + \frac{D_{Rm}}{10.081} \right)^{1/2} Pa\text{-sec}$		Note 2	$= 91.4M^{1/3} \left(1 + \frac{D_{Rm}}{10.081} \right)^{1/2} Pa\text{-sec}$		

¹ Impulse calculated over a delivery time that is the lesser of the initial positive pressure duration or 20 percent of the natural period of the assumed-spherical lung adjusted for animal size and depth.

Notes: GI = gastrointestinal, M = mass of animals in kilograms, D_{Rm} = depth of receiver (animal) in meters, SEL = Sound Exposure Level, SPL = Sound Pressure Level (re 1 μPa), dB = decibels, re 1 μPa = referenced to one micropascal, dB re 1 $\mu\text{Pa}^2\text{-s}$ = decibels referenced to one micropascal squared second

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TABLE 9—BEHAVIORAL THRESHOLDS FOR IMPULSIVE SOUND

Hearing group	Impulsive behavioral threshold for >2 pulses/24 hours	Onset TTS
Low-Frequency Cetaceans	167 dB SEL (LF _{II})	172 dB SEL (MF _{II}) or 224 dB Peak SPL.
Mid-Frequency Cetaceans	167 dB SEL (MF _{II})	
High-Frequency Cetaceans	141 dB SEL (HF _{II})	146 dB SEL (HF _{II}) or 195 dB Peak SPL.
Phocid Seals (in water)	172 dB SEL (P _{WI})	177 dB SEL (P _{WI}) or 212 dB Peak SPL.

TABLE 9—BEHAVIORAL THRESHOLDS FOR IMPULSIVE SOUND—Continued

Hearing group	Impulsive behavioral threshold for >2 pulses/24 hours	Onset TTS
Otariidae & Mustelidae (in water)	195 dB SEL (O_{WI})	200 dB SEL (O_{WI}) or 212 dB Peak SPL.

Notes: (1) LF_{II} , MF_{II} , HF_{II} are New compound Type II weighting functions; P_{WI} , O_{WI} = Original Type I (Southall *et al.*, 2007) for pinniped and mustelid in water (see Finneran and Jenkins 2012). (2) SEL = $re\ 1\ \mu Pa^2\cdot s$; SPL = $re\ 1\ \mu Pa$, SEL = Sound Exposure Level, dB = decibel, SPL = Sound Pressure Level.

Take Request

The GOA FSEIS/OEIS considered all training activities proposed to occur in the Study Area that have the potential to result in the take of marine mammals as defined by the MMPA. The stressors associated with these activities included the following:

- Acoustic (sonar and other active non-impulse sources, explosives, swimmer defense airguns, weapons firing, launch and impact noise, vessel noise, aircraft noise);
- Energy (electromagnetic devices);
- Physical disturbance or strikes (vessels, in-water devices, military expended materials, seafloor devices);
- Entanglement (fiber optic cables, guidance wires, parachutes);

- Ingestion (munitions, military expended materials other than munitions); and
- Secondary stressors (sediments and water quality).

The Navy determined, and NMFS agrees, that two stressors could potentially result in the incidental taking of marine mammals from training activities within the Study Area: (1) Non-impulsive stressors (sonar and other active acoustic sources) and (2) impulsive stressors (explosives). Non-impulsive and impulsive stressors have the potential to result in incidental takes of marine mammals by harassment, injury, or mortality. Explanation of why the other stressors listed above are

unlikely to result in the incidental taking of marine mammals is provided in the FSEIS/OEIS and the proposed rule.

Training Activities

Based on the Navy’s model and post-model analysis, modified as described below, Table 10 summarizes the Navy’s final take request for training activities for a year (1 exercise occurring over a 7-month period (April–October) and the summation over a 5-year period (1 exercise occurring over a 7-month period (April–October) for a total of 5 exercises).

TABLE 10—SUMMARY OF ANNUAL AND 5-YEAR TAKE REQUESTS FOR GOA TMAA TRAINING ACTIVITIES

MMPA category	Source	Training activities	
		Annual authorization sought	5-Year authorization sought
Mortality	Explosives	0	0.
Level A	Sonar and other active acoustic sources; explosives.	4 (Dall’s porpoise only as shown in Table 11).	20 (Dall’s porpoise only as shown in Table 11).
Level B	Sonar and other active acoustic sources; explosives.	18,250 (Species specific data shown in Table 11).	91,250 (Species specific data shown in Table 11).

Impulsive and Non-Impulsive Sources

Table 11 provides details on the Navy’s final take request for training activities by species from the acoustic effects modeling estimates. There are no mortalities predicted for any species incidental to the proposed training activities. Only four Level A harassment takes are predicted to occur for one species (*i.e.*, Dall’s porpoises).

Derivations of the numbers presented in Table 11 are described in more detail within Chapter 6 of the LOA application, but modified as described in the “Summary of Request” section. As described in that section, take estimates have changed since publication of proposed rule based on the following:

(1) The Navy modified its incidental take request to reflect the level of activities described by Alternative 1 of the FSEIS/OEIS (as opposed to

Alternative 2) following a reassessment of reasonably foreseeable training requirements for the GOA TMAA. This change in alternative will reduce the total anticipated amount of annual training activities by reducing the number of annual Carrier Strike Group Exercises from 2 to 1 and the number of SINKEXs from 2 to 0 (see “Summary of Request”), ultimately reducing the take authorized. Thus, the take estimates shown in Table 11 reflect those presented for Alternative 1 in the GOA FSEIS/OEIS and are greatly reduced from what was presented in the proposed rule and the Navy’s application.

(2) Level A and Level B harassment takes shown in Table 11 are slightly different for one species (*i.e.*, for Dall’s porpoise only) from what is described in Alternative 1 of the FSEIS/OEIS. This change is a result of the Navy’s

reprocessing of anticipated explosive ranges to effects for Level A and Level B harassment based on NMFS’ new Guidance to assess if the new acoustic thresholds in the Guidance could result in any additional species-specific injury exposures when applied to GOA Phase II training activities. The Navy’s analysis found that applying the new thresholds to the training activities addressed by Alternative 1 would result in an additional three Dall’s porpoise Level A harassment (PTS) takes from explosives and an additional 149 Level B harassment takes (TTS and behavioral responses) compared to the take numbers presented in Alternative 1 of the FSEIS/OEIS. The Navy’s analysis concluded that applying the new acoustic criteria would result in no additional anticipated explosive takes to any other species.

TABLE 11—SPECIES-SPECIFIC TAKE REQUESTS FROM MODELING ESTIMATES OF IMPULSIVE AND NON-IMPULSIVE SOURCE EFFECTS FOR ALL TRAINING ACTIVITIES

Species	Stock	Annual		5-year		
		Level B	Level A	Level B	Level A	
North Pacific right whale Humpback whale *	Eastern North Pacific	3	0	15	0	
	Central North Pacific	61	0	305	0	
	California, Washington, Oregon	7	0	35	0	
	Western North Pacific	1	0	5	0	
Blue whale	Eastern North Pacific	47	0	235	0	
	Central North Pacific	0	0	0	0	
Fin whale	Northeast Pacific	1,291	0	6,455	0	
Sei whale	Eastern North Pacific	6	0	30	0	
Minke whale	Alaska	43	0	215	0	
Gray whale	Eastern North Pacific	0	0	0	0	
	Western North Pacific	0	0	0	0	
Sperm whale	North Pacific	98	0	490	0	
Killer whale	Alaska Resident	281	0	1,405	0	
	Eastern North Pacific Offshore	26	0	130	0	
	AT1 Transient	0	0	0	0	
	GOA, Aleutian Island, and Bearing Sea Transient	72	0	360	0	
Pacific white-sided dolphin	North Pacific	981	0	4,905	0	
Harbor porpoise	Gulf of Alaska	2,742	0	13,710	0	
	Southeast Alaska	963	0	4,815	0	
Dall's porpoise **	Alaska	8,270	** 4	41,350	20	
Cuvier's beaked whale ..	Alaska	1,271	0	6,355	0	
Baird's beaked whale ...	Alaska	200	0	1,000	0	
Stejneger's beaked whale ..	Alaska	576	0	2,880	0	
Steller sea lion	Eastern U.S.	335	0	1,675	0	
	Western U.S.	286	0	1,430	0	
California sea lion	U.S.	2	0	10	0	
Northern fur seal	Eastern Pacific-Alaska	713	0	3,565	0	
Northern elephant seal ..	California Breeding	122	0	610	0	
Harbor seal	Aleutian Islands	0	0	0	0	
	Pribilof Islands	0	0	0	0	
	Bristol Bay	0	0	0	0	
	North Kodiak	0	0	0	0	
	South Kodiak	1	0	5	0	
	Prince William Sound	1	0	5	0	
	Cook Inlet/Shelikof	0	0	0	0	
	Glacier Bay/Icy Strait	0	0	0	0	
	Sitka/Chatham	0	0	0	0	
	Dixon/Cape Decision	0	0	0	0	
	Alaska	0	0	0	0	
	Ribbon seal	Alaska	0	0	0	0
	Totals		18,250	4	91,250	20

* Since the publication of the proposed rule, NMFS requested that the Navy include an additional ESA-listed stock of humpback whale (CA/OR/WA stock) that could have some elements of its population in or transiting the GOA TMAA. NMFS agreed with the Navy's assessment that the most accurate approach would be to re-proportion total modeled humpback whale takes to all three stocks based on best available science. The Navy prorated existing modeled humpback whale takes into three parts based on relative abundance between the Central North Pacific stock, the CA/OR/WA stock, and the Western North Pacific stock as detailed in scientific sighting and genetic studies (Calambokidis *et al.*, 2008). Thus, Table 11 shows the revised prorated breakdown of Level B harassment takes by humpback whale stocks. Total number of takes does not differ from what was determined for the proposed rule, nor does our negligible impact determination for this species change, as discussed below.

** The Navy, at NMFS' request, provided a quantitative analysis of how explosive takes could change if the new NMFS acoustic criteria were applied retroactively to GOA Phase II results. The Navy's analysis concluded that changes in the take estimate would occur for only one species (Dall's porpoise) under this assessment (+3 Level A PTS and +149 Level B (TTS and behavior) takes as compared to Alternative 1 of the FSEIS/OEIS).

Marine Mammal Habitat

The Navy's proposed training activities could potentially affect marine mammal habitat through the introduction of sound into the water column, impacts to the prey species of marine mammals, bottom disturbance, or changes in water quality. Each of these components was considered in Chapter 3 of the GOA FSEIS/OEIS.

Based on the information in the "Marine Mammal Habitat" section of the proposed rule (81 FR 9950, 10000-03; February 26, 2016) and the supporting information included in the GOA FSEIS/OEIS, NMFS has determined that training activities would not have adverse or long-term impacts on marine mammal habitat. In summary, expected effects to marine mammal habitat will include transitory elevated levels of

anthropogenic sound in the water column; short-term physical alteration of the water column or bottom topography; brief disturbances to marine invertebrates; localized and infrequent disturbance to fish; a limited number of fish mortalities; and temporary marine mammal avoidance.

Analysis and Negligible Impact Determination (NID)

Negligible impact is “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival” (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes, alone, is not enough information on which to base an impact determination, as the severity of harassment may vary greatly depending on the context and duration of the behavioral response, many of which would not be expected to have deleterious impacts on the fitness of any individuals. In determining whether the expected takes will have a negligible impact, in addition to considering estimates of the number of marine mammals that might be “taken,” NMFS must consider other factors, such as the likely nature of any responses (their intensity, duration, etc.), the context of any responses (critical reproductive time or location, migration, etc.), as well as the number and nature (*e.g.*, severity) of estimated Level A harassment takes, the number of estimated mortalities, and the status of the species. As a reminder, the GOA TMAA training activities will not occur continuously throughout the year, but rather, for a maximum of 21 days once annually between April and October.

The Navy’s specified activities have been described based on best estimates of the maximum amount of sonar and other acoustic source use or detonations that the Navy would conduct. There may be some flexibility in that the exact number of hours, items, or detonations may vary from year to year, but the total amount of incidental take is not authorized to exceed the 5-year totals indicated in Table 11. We base our analysis and NID on the maximum number of takes authorized, although, as stated before, the number of takes are only a part of the analysis, which includes extensive qualitative consideration of other contextual factors that influence the degree of impact of the takes on the effected individuals. To avoid repetition, we provide some general analysis immediately below that applies to all the species listed in Table 11, given that some of the anticipated effects (or lack thereof) of the Navy’s training activities on marine mammals are expected to be relatively similar in nature. However, below that, we break our analysis into species, or groups of

species where relevant similarities exist, to provide more specific information related to the anticipated effects on individuals or where there is information about the status or structure of any species that would lead to a differing assessment of the effects on the population.

The Navy’s take request is based on its model and post-model analysis, modified as described in the “Summary of Request” and “Take Request” sections. In the discussions below, the “acoustic analysis” refers to the Navy’s modeling results and post-model analysis. The model calculates sound energy propagation from sonar, other active acoustic sources, and explosives during naval activities; the sound or impulse received by animal dosimeters representing marine mammals distributed in the area around the modeled activity; and whether the sound or impulse received by a marine mammal exceeds the thresholds for effects. The model estimates are then further analyzed to consider animal avoidance and implementation of highly effective mitigation measures to prevent Level A harassment, resulting in final estimates of effects due to Navy training. NMFS provided input to the Navy on this process and the Navy’s qualitative analysis is described in detail in Chapter 6 of its LOA application (<http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>).

Generally speaking, and especially with other factors being equal, the Navy and NMFS anticipate more severe effects from takes resulting from exposure to higher received levels (although this is in no way a strictly linear relationship throughout species, individuals, or circumstances) and less severe effects from takes resulting from exposure to lower received levels. The requested number of Level B harassment takes does not equate to the number of individual animals the Navy expects to harass (which is lower), but rather to the instances of take (*i.e.*, exposures above the Level B harassment threshold) that would occur. These instances may represent either a very brief exposure (seconds) or, in some cases, longer durations of exposure within a day. Depending on the location, duration, and frequency of activities, along with the distribution and movement of marine mammals, individual animals may be exposed to impulse or non-impulse sounds at or above the Level B harassment threshold on multiple days. However, the Navy is currently unable to estimate the number of individuals that may be taken during training activities. Therefore, the model results estimate the total number of takes that

may occur to a smaller number of individuals. While the model shows that an increased number of exposures may take place due to an increase in events/activities and ordnance, the types and severity of individual responses to training and activities are not expected to change.

Behavioral Responses

As discussed in the proposed rule, marine mammals can respond to LF/MFAS/HFAS in many different ways, a subset of which qualifies as Level B harassment. As described in the proposed rule, the Navy uses the behavioral response function to quantify the number of behavioral responses that would qualify as Level B harassment under the MMPA. As the statutory definition is currently applied, a wide range of behavioral reactions may qualify as Level B harassment under the MMPA, including but not limited to avoidance of the sound source, temporary changes in vocalizations or dive patterns, temporary avoidance of an area, or temporary disruption of feeding, migrating, or reproductive behaviors. The estimates calculated using the behavioral response function do not differentiate between the different types of potential reactions. Nor do the estimates provide information regarding the potential fitness or other biological consequences of the reactions on the affected individuals. We therefore consider the available scientific evidence to determine the likely nature of the modeled behavioral responses and the potential fitness consequences for affected individuals.

For LF/MFAS/HFAS use in the GOA TMAA, the Navy provided information (Table 12) estimating the percentage of Level B harassment that would occur within the 6-dB bins (without considering mitigation or avoidance). As mentioned above, an animal’s exposure to a higher received level is more likely to result in a behavioral response that is more likely to adversely affect the health of the animal. As illustrated below, the majority (including about 65–72 percent for the most powerful ASW hull-mounted sonar, which is responsible for a large portion of the sonar takes) of calculated takes from MFAS result from exposures less than 162 dB and more than 20km away. Less than 1–2 percent of the takes are expected to result from exposures above 168 dB or closer than 4km. Specifically, given a range of behavioral responses that may be classified as Level B harassment, to the degree that higher received levels are expected to result in more severe behavioral responses, only

a small percentage of the anticipated Level B harassment from Navy activities might necessarily be expected to potentially result in more severe responses, especially when the distance from the source at which the levels below are received is considered (see Table 12). Marine mammals are able to discern the distance of a given sound

source, and given other equal factors (including received level), they have been reported to respond more to sounds that are closer (DeRuiter *et al.*, 2013). Further, the estimated number of responses do not reflect either the duration or context of those anticipated responses, some of which will be of very short duration, and other factors should

be considered when predicting how the estimated takes may affect individual fitness. A recent study by Moore and Barlow (2013) emphasizes the importance of context (*e.g.*, behavioral state of the animals, distance from the sound source, etc.) in evaluating behavioral responses of marine mammals to acoustic sources.

TABLE 12—NON-IMPULSIVE RANGES TO RECEIVED SOUND PRESSURE LEVELS IN 6-dB BINS AND PERCENTAGE OF LEVEL B HARASSMENTS FOR THREE REPRESENTATIVE SONAR SYSTEMS

Received level	Sonar Bin MF1 (<i>e.g.</i> , SQS-53; ASW hull mounted sonar)		Sonar Bin MF4 (<i>e.g.</i> , AQS-22; ASW dipping sonar)		Sonar Bin MF5 (<i>e.g.</i> , SSQ-62; ASW sonobuoy)	
	Distance at which levels occur within radius of source (m)	Percentage of behavioral harassments occurring at given levels	Distance at which levels occur within radius of source (m)	Percentage of behavioral harassments occurring at given levels	Distance at which levels occur within radius of source (m)	Percentage of behavioral harassments occurring at given levels
Low Frequency Cetaceans						
120 ≤ SPL < 126	185,400–160,325	0	91,363–70,650	0	20,463–12,725	0
126 ≤ SPL < 132	160,325–138,400	0	70,650–49,125	0	12,725–7,575	0
132 ≤ SPL < 138	138,400–118,100	0	49,125–28,950	4	7,575–3,813	5
138 ≤ SPL < 144	118,100–85,400	2	28,950–10,800	29	3,813–2,200	15
144 ≤ SPL < 150	85,400–61,288	7	10,800–4,250	29	2,200–638	51
150 ≤ SPL < 156	61,288–42,750	19	4,250–2,013	19	638–250	18
156 ≤ SPL < 162	42,750–20,813	43	2,013–638	16	250–100	9
162 ≤ SPL < 168	20,813–4,375	26	638–200	3	100–<50	3
168 ≤ SPL < 174	4,375–1,825	1	200–100	0	<50	0
174 ≤ SPL < 180	1,825–750	0	100–<50	0	<50	0
180 ≤ SPL < 186	750–375	0	<50	0	<50	0
186 ≤ SPL < 192	375–200	0	<50	0	<50	0
192 ≤ SPL < 198	200–100	0	<50	0	<50	0
Odontocetes and Pinnipeds						
120 ≤ SPL < 126	185,450–160,475	0	93,075–71,275	0	21,288–14,200	0
126 ≤ SPL < 132	160,475–138,750	0	71,275–50,938	0	14,200–8,238	0
132 ≤ SPL < 138	138,750–123,113	0	50,938–29,075	1	8,238–4,350	1
138 ≤ SPL < 144	123,113–85,450	1	29,075–11,050	14	4,350–2,425	6
144 ≤ SPL < 150	85,450–61,363	4	11,050–4,250	25	2,425–1,213	24
150 ≤ SPL < 156	61,363–42,763	14	4,250–2,013	24	1,213–250	54
156 ≤ SPL < 162	42,763–21,025	44	2,013–638	28	250–150	7
162 ≤ SPL < 168	21,025–4,475	35	638–200	7	150–<50	9
168 ≤ SPL < 174	4,475–1,850	2	200–100	1	<50	0
174 ≤ SPL < 180	1,850–763	0	100–<50	0	<50	0
180 ≤ SPL < 186	763–400	0	<50	0	<50	0
186 ≤ SPL < 192	400–200	0	<50	0	<50	0
192 ≤ SPL < 198	200–100	0	<50	0	<50	0

Notes: (1) ASW = anti-submarine warfare, m = meters, SPL = sound pressure level; (2) Odontocete behavioral response function is also used for high-frequency cetaceans, phocid seals, otariid seals and sea lions, and sea otters.

Although the Navy has been monitoring to discern the effects of LF/MFAS/HFAS on marine mammals since 2006, and research on the effects of MFAS is advancing, our understanding of exactly how marine mammals in the Study Area will respond to LF/MFAS/HFAS is still improving. However, the Navy has submitted more than 80 reports, including Major Exercise Reports, Annual Exercise Reports, and Monitoring Reports, documenting hundreds of thousands of marine mammals across Navy range complexes, and there are only two instances of overt

behavioral disturbances that have been observed. One cannot conclude from these results that marine mammals were not harassed from MFAS/HFAS, as a portion of animals within the area of concern were not seen (especially those more cryptic, deep-diving species, such as beaked whales or *Kogia* spp.), the full series of behaviors that would more accurately show an important change is not typically seen (*i.e.*, only the surface behaviors are observed), and some of the non-biologist watchstanders might not be well-qualified to characterize behaviors. However, one can say that

the animals that were observed did not respond in any of the obviously more severe ways, such as panic, aggression, or anti-predator response.

Some of the lower level physiological stress responses discussed in the Potential Effects section of the proposed rule would also likely co-occur with the predicted harassments, although these responses are more difficult to detect and fewer data exist relating these responses to specific received levels of sound. Level B harassment takes, then, may have a stress-related physiological component as well; however, we would

not expect the Navy's generally short-term, intermittent, and (in the case of sonar) transitory activities to create conditions of long-term, continuous noise leading to long-term physiological stress responses in marine mammals.

Diel Cycle

As noted in the Potential Effects section of the proposed rule, many animals perform vital functions, such as feeding, resting, traveling, and socializing on a diel cycle (24-hour cycle). Behavioral reactions to noise exposure (when taking place in a biologically important context, such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.*, 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered severe unless it could directly affect reproduction or survival (Southall *et al.*, 2007). Note that there is a difference between multiple-day substantive behavioral reactions and multiple-day anthropogenic activities. For example, just because an at-sea exercise lasts for multiple days does not necessarily mean that individual animals are either exposed to those exercises for multiple days or, further, exposed in a manner resulting in a sustained multiple day substantive behavioral response. Large multi-day Navy exercises, such as those proposed in the GOA TMAA, typically include vessels that are continuously moving at speeds typically 10–15 knots, or higher, and likely cover large areas that are relatively far from shore, in addition to the fact that marine mammals are moving as well, which would make it unlikely that the same animal could remain in the immediate vicinity of the ship for the entire duration of the exercise. Additionally, the Navy does not necessarily operate active sonar the entire time during an exercise (though exercise reports are classified, the unclassified report for the 2011 training events indicated that sonar was operated for a total of 67 minutes in the 12-day exercise). While it is certainly possible that these sorts of exercises could overlap with individual marine mammals multiple days in a row at levels above those anticipated to result in a take, because of the factors mentioned above, it is considered unlikely for the majority of takes. Even if an exercise overlaps with an individual marine mammal multiple days in a row, this does not mean that a behavioral response is necessarily sustained for multiple days, but instead

necessitates the consideration of likely duration and context to assess any effects on the individual's fitness.

Durations for non-impulsive activities utilizing tactical sonar sources vary and are fully described in Appendix A of the GOA FSEIS/OEIS. ASW training exercises using MFAS/HFAS proposed for the GOA TMAA generally last for 2–16 hours, and may have intervals of non-activity in between. Because of the need to train in a large variety of situations (in the case of the GOA TMAA, complex bathymetric and oceanographic conditions include a continental shelf, submarine canyons, seamounts, and fresh water infusions from multiple sources), the Navy does not typically conduct successive ASW exercises in the same locations. Given the average length of ASW exercises (times of continuous sonar use) and typical vessel speed, combined with the fact that the majority of the cetaceans in the GOA TMAA Study Area would not likely remain in an area for successive days, it is unlikely that an animal would be exposed to MFAS/HFAS at levels likely to result in a substantive response that would then be carried on for more than one day or on successive days.

Planned explosive exercises for the GOA TMAA are of a short duration (1–6 hours). Although explosive exercises may sometimes be conducted in the same general areas repeatedly, because of their short duration and the fact that they are in the open ocean and animals can easily move away, it is similarly unlikely that animals would be exposed for long, continuous amounts of time.

Temporary Threshold Shifts (TTS)

As mentioned previously, TTS can last from a few minutes to days, be of varying degree, and occur across various frequency bandwidths, all of which determine the severity of the impacts on the affected individual, which can range from minor to more severe. The TTS sustained by an animal is primarily classified by three characteristics:

1. *Frequency*—Available data (of mid-frequency hearing specialists exposed to mid- or high-frequency sounds; Southall *et al.*, 2007) suggest that most TTS occurs in the frequency range of the source up to one octave higher than the source (with the maximum TTS at $\frac{1}{2}$ octave above). The more powerful MF sources used have center frequencies between 3.5 and 8 kHz and the other unidentified MF sources are, by definition, less than 10 kHz, which suggests that TTS induced by any of these MF sources would be in a frequency band somewhere between approximately 2 and 20 kHz. There are fewer hours of HF source use and the

sounds would attenuate more quickly. They also have lower source levels, but if an animal were to incur TTS from these sources, it would cover a higher frequency range (sources are between 20 and 100 kHz, which means that TTS could range up to 200 kHz; however, HF systems are typically used less frequently and for shorter time periods than surface ship and aircraft MF systems, so TTS from these sources is even less likely). TTS from explosives would be broadband. Vocalization data for each species, which would inform how TTS might specifically potentially interfere with communications with conspecifics, was provided in the LOA application.

2. *Degree of the shift* (*i.e.*, by how many dB the sensitivity of the hearing is reduced)—Generally, both the degree of TTS and the duration of TTS will be greater if the marine mammal is exposed to a higher level of energy (which would occur when the peak dB level is higher or the duration is longer). The threshold for the onset of TTS was discussed previously in this final rule. An animal would have to approach closer to the source or remain in the vicinity of the sound source appreciably longer to increase the received SEL, which would be difficult considering the Lookouts and the nominal speed of an active sonar vessel (10–15 knots). In the TTS studies (see *Threshold Shift* section of the proposed rule), some using exposures of almost an hour in duration or up to 217 SEL, most of the TTS induced was 15 dB or less, though Finneran *et al.* (2007) induced 43 dB of TTS with a 64-second exposure to a 20 kHz source. However, MFAS emits a short ping typically every 50 seconds, and TTS incurred from these activities would likely be of smaller degree and shorter duration.

3. *Duration of TTS (recovery time)*—In the TTS laboratory studies (see *Threshold Shift* section of the proposed rule), some using exposures of almost an hour in duration or up to 217 SEL, almost all individuals recovered within 1 day (or less, often in minutes), although in one study (Finneran *et al.*, 2007), recovery took 4 days. In this case, because of the likely SEL exposure, TTS incurred would be expected to be less and recovery time would be shorter.

Based on the range of degree and duration of TTS reportedly induced by exposures to non-pulse sounds of energy higher than that to which free-swimming marine mammals in the field are likely to be exposed during MFAS/HFAS training exercises in the GOA TMAA, it is unlikely that marine mammals would ever sustain a TTS from MFAS that alters their sensitivity

by more than 20 dB for more than a few days (and any incident of TTS would likely be far less severe due to the short duration of the majority of the exercises and the speed of a typical vessel). Also, for the same reasons discussed in the *Diel Cycle* section, and because of the short distance within which animals would need to approach the sound source, it is unlikely that animals would be exposed to the levels necessary to induce TTS in subsequent time periods such that their recovery is impeded. Additionally, though the frequency range of TTS that marine mammals might sustain would overlap with some of the frequency ranges of their vocalization types, the frequency range of TTS from MFAS (the source from which TTS would most likely be sustained because the higher source level and slower attenuation make it more likely that an animal would be exposed to a higher received level) would not usually span the entire frequency range of one vocalization type, much less span all types of vocalizations or other critical auditory cues. If impaired, marine mammals would typically be aware of their impairment and are sometimes able to implement behaviors to compensate (see *Acoustic Masking or Communication Impairment* section), though these compensations may incur energetic costs. Because of the low levels and short duration of TTS expected to result from these activities, little, if any, energetic costs would be expected to be incurred.

Acoustic Masking or Communication Impairment

Masking only occurs during the time of the signal (and potential secondary arrivals of indirect rays), versus TTS, which continues beyond the duration of the signal. Standard MFAS typically pings every 50 seconds for hull-mounted sources. For the sources for which we know the pulse length, most are significantly shorter than hull-mounted active sonar, on the order of several microseconds to tens of microseconds. For hull-mounted active sonar, though some of the vocalizations that marine mammals make are less than one second long, there is only a 1 in 50 chance that they would occur exactly when the ping was received, and when vocalizations are longer than one second, only parts of them are masked. Alternately, when the pulses are only several microseconds long, the majority of most animals' vocalizations would not be masked. Masking effects from MFAS/HFAS are expected to be minimal. If masking or communication impairment were to occur briefly, it

would be in the frequency range of MFAS, which overlaps with some marine mammal vocalizations; however, it would likely not mask the entirety of any particular vocalization, communication series, or other critical auditory cue, because the signal length, frequency, and duty cycle of the MFAS/HFAS signal does not perfectly mimic the characteristics of any marine mammal's vocalizations. The other sources used in Navy training, many of either higher frequencies (meaning that the sounds generated attenuate even closer to the source) or lower amounts of operation, are similarly not expected to result in masking.

PTS, Injury, or Mortality

NMFS believes that many marine mammals would deliberately avoid exposing themselves to the received levels of active sonar necessary to induce injury by moving away from or at least modifying their path to avoid a close approach. Additionally, in the unlikely event that an animal approaches the sonar vessel at a close distance, NMFS believes that the mitigation measures (*i.e.*, shutdown/powerdown zones for MFAS/HFAS) would typically ensure that animals would not be exposed to injurious levels of sound. As discussed previously, the Navy utilizes both aerial (when available) and passive acoustic monitoring (during all ASW exercises) in addition to watchstanders on vessels to detect marine mammals for mitigation implementation. There was no modeled prediction of mortality to any species that occurs in the Study Area as a result of the Navy's training activities.

If a marine mammal is able to approach a surface vessel within the distance necessary to incur PTS, the likely speed of the vessel (nominal 10–15 knots) would make it very difficult for the animal to remain in range long enough to accumulate enough energy to result in more than a mild case of PTS. As mentioned previously and in relation to TTS, the likely consequences to the health of an individual that incurs PTS can range from mild to more serious dependent upon the degree of PTS and the frequency band it is in, and many animals are able to compensate for the shift, although it may include energetic costs. Because of the small degree of PTS that would likely result, if it occurs, any energetic costs incurred by four Dall's porpoises would be expected to be relatively small.

No Level A harassment takes are predicted to occur to any species from exposure to non-impulsive sound. As mentioned previously, the Navy

reprocessed anticipated ranges to PTS for impulsive sources (explosives) based on NMFS' new Guidance to assess if the new acoustic criteria could result in any additional species-specific injury exposures. The Navy did not reprocess anticipated sonar ranges to effects for PTS because the acoustic thresholds used in the Navy's modeling are largely more conservative than the new Guidance, and NMFS and the Navy qualitatively evaluated (described earlier) the effects the change would have on our analyses. The Navy's analysis concluded that only four Level A (PTS) takes per year to one species (Dall's porpoise) are predicted to occur from GOA training activities. No species other than Dall's porpoise would be expected to incur PTS from explosives if the new Guidance was applied to the Navy's activities.

We assume that the acoustic exposures sufficient to trigger onset PTS (or TTS) would be accompanied by behavioral responses and/or physiological stress responses, although the sound characteristics that correlate with specific stress responses in marine mammals are poorly understood. However, as discussed above in the "Behavioral Responses" section, we would not expect the Navy's generally short-term, intermittent, and (in the case of sonar) transitory activities to create conditions of long-term, continuous noise leading to long-term physiological stress responses in marine mammals.

As discussed previously, marine mammals (especially beaked whales) could potentially respond to MFAS at a received level lower than the injury threshold in a manner that indirectly results in the animals stranding. The exact mechanism of this potential response, behavioral or physiological, is not known. When naval exercises have been associated with strandings in the past, it has typically been when three or more vessels are operating simultaneously, in the presence of a strong surface duct, and in areas of constricted channels, semi-enclosed areas, and/or steep bathymetry. While these features certainly do not define the only factors that can contribute to a stranding, and while they need not all be present in their aggregate to increase the likelihood of a stranding, it is worth noting that they are not all present in the GOA TMAA, which only has a strong surface duct present during the winter, and does not have bathymetry or constricted channels of the type that have been present in the sonar associated strandings. When this is combined with consideration of the number of hours of active sonar training that will be conducted and the total

duration of all training exercises (a maximum of 21 days once a year), we believe that the probability that this will occur is small and we have not authorized this type of take to occur. Lastly, an active sonar shutdown protocol for strandings involving live animals milling in the water minimizes the chances that these types of events turn into mortalities.

As stated previously, there have been no recorded Navy vessel strikes of any marine mammals during training in the GOA Study Area to date, nor were takes by injury or mortality resulting from vessel strike predicted in the Navy's analysis.

Group and Species-Specific Analysis

Predicted effects on marine mammals from exposures to sonar and other active acoustic sources and explosions during annual training activities are shown in Table 11. The vast majority of predicted exposures (greater than 99 percent) are expected to be Level B harassment (non-injurious TTS and behavioral reactions) from sonar and other active acoustic sources at relatively low received levels (Table 12). The acoustic analysis predicts the majority of marine mammal species in the Study Area would not be exposed to explosive (impulsive) sources associated with training activities. Only Dall's porpoise is predicted to have Level B (TTS) exposures resulting from explosives, and only a limited number (4) of Dall's porpoise are expected to have injurious take (PTS), which are from explosions. There are no lethal takes predicted for any marine mammal species for the GOA activities.

The analysis below may in some cases (e.g., mysticetes, porpoises, pinnipeds) address species collectively if they occupy the same functional hearing group (i.e., low, mid, and high-frequency cetaceans and pinnipeds in water), have similar hearing capabilities, and/or are known to generally behaviorally respond similarly to acoustic stressors. Where there are meaningful differences between species or stocks in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, they will either be described within the section or the species will be included as a separate sub-section.

Mysticetes—The Navy's acoustic analysis predicts that 2,923 instances of Level B harassment of mysticete whales may occur in the Study Area each year from sonar and other active acoustic sources during training activities. Annual species-specific take estimates

are as follows: 3 North Pacific right whales (Eastern North Pacific stock), 69 humpback whales (Central North Pacific, Western North Pacific, and CA/OR/WA stocks), 47 blue whales (Eastern North Pacific stock), 1,291 fin whales (Northeast Pacific stock), 6 sei whales (Eastern North Pacific stock), and 43 minke whales (Alaska stock). Of these species, humpback (Western North Pacific DPS and Mexico DPS), blue, fin, sei, and North Pacific right whales are listed as threatened or endangered under the ESA and depleted under the MMPA. NMFS issued a Biological Opinion concluding that the issuance of the rule and subsequent LOA are likely to adversely affect, but are not likely to jeopardize, the continued existence of the threatened and endangered species under NMFS' jurisdiction and are not likely to result in the destruction or adverse modification of critical habitat in the GOA TMAA Study Area (there is no designated critical habitat for mysticetes in the Study Area.). Based on the distribution information presented in the LOA application, it is highly unlikely that gray whales would be encountered in the Study Area during events involving use of sonar and other active acoustic sources. The acoustic analysis did not predict any takes of gray whales and NMFS is not authorizing any takes of this species.

Generally, these represent a limited number of takes relative to population estimates for most mysticete stocks in the Study Area. When the numbers of behavioral takes are compared to the estimated stock abundance and if one assumes that each take happens to a separate animal, less than approximately 10 percent of each of these stocks, with the exception of the Northeast Pacific stock of fin whale and the Alaska stock of minke whale, would be behaviorally harassed during the course of a year. There currently are no reliable population estimates for the Northeast Pacific stock of fin whale and the Alaska stock of minke whale because only portions of the stocks' range have been surveyed (Muto and Angliss, 2016). However, NMFS believes the portion of these stocks expected to be taken is relatively small. Older provisional surveys in small subsets of the Minke range (Bering shelf and shelf and nearshore waters from Kenai Fjords to the Aleutians) showed partial abundances of 389–2,020 and 1,233, respectively, suggesting numbers larger than the sum of those if all areas in the Alaska range were surveyed. A provisional estimate of the minimum population of portion of the fin whale range west of the Kenai peninsula

(about a third of the range) is 1,368 and earlier estimates of multiple subsets of the portion of the population east of the Kenai peninsula were in the thousands, suggesting that the abundance of the full population is at least more than several thousand. Because the estimates given above represent the total number of exposures and not necessarily the number of individuals exposed, it is more likely that fewer individuals would be taken, but a subset would be taken more than one time per year. In the ocean, the use of sonar and other active acoustic sources is transient and is unlikely to repeatedly expose the same population of animals over a short period.

Level B harassment takes are anticipated to be in the form of TTS and behavioral reactions and no injurious takes of North Pacific right, humpback, blue, fin, minke, or sei whales from sonar and other active acoustic stressors or explosives are expected. The majority of acoustic effects to mysticetes from sonar and other active sound sources during training activities would be primarily from anti-submarine warfare events involving surface ships and hull mounted sonar. Research and observations show that if mysticetes are exposed to sonar or other active acoustic sources they may react in a number of ways depending on the characteristics of the sound source, their experience with the sound source, and whether they are migrating or on seasonal grounds (i.e., breeding or feeding). Reactions may include alerting, breaking off feeding dives and surfacing, diving or swimming away, or no response at all (Richardson, 1995; Nowacek, 2007; Southall *et al.*, 2007; Finneran and Jenkins, 2012). Richardson *et al.* (1995) noted that avoidance (temporary displacement of an individual from an area) reactions are the most obvious manifestations of disturbance in marine mammals. Avoidance is qualitatively different from the startle or flight response, but also differs in the magnitude of the response (i.e., directed movement, rate of travel, etc.). Oftentimes avoidance is temporary, and animals return to the area once the noise has ceased. Additionally, migrating animals may ignore a sound source, or divert around the source if it is in their path.

Specific to U.S. Navy systems using low frequency sound, studies were undertaken in 1997–98 pursuant to the Navy's Low Frequency Sound Scientific Research Program. These studies found only short-term responses to low frequency sound by mysticetes (fin, blue, and humpback whales) including changes in vocal activity and avoidance

of the source vessel (Clark, 2001; Miller *et al.*, 2000; Croll *et al.*, 2001; Frstrup *et al.*, 2003; Nowacek *et al.*, 2007). Baleen whales exposed to moderate low-frequency signals demonstrated no variation in foraging activity (Croll *et al.*, 2001). Low-frequency signals of the Acoustic Thermometry of Ocean Climate sound source were not found to affect dive times of humpback whales in Hawaiian waters (Frankel and Clark, 2000).

Specific to mid-frequency sound, studies by Melcón *et al.* (2012) in the Southern California Bight found that the likelihood of blue whale low-frequency calling (usually associated with feeding behavior) decreased with an increased level of MFAS, beginning at a SPL of approximately 110–120 dB re 1 μ Pa. However, it is not known whether the lower rates of calling actually indicated a reduction in feeding behavior or social contact since the study used data from remotely deployed, passive acoustic monitoring buoys. Results from a behavioral response study in Southern California waters indicated that in some cases and at low received levels, tagged blue whales responded to MFAS but that those responses were mild and there was a quick return to their baseline activity (Southall *et al.*, 2011; Southall *et al.*, 2012b). Blue whales responded to a mid-frequency sound source, with a source level between 160 and 210 dB re 1 μ Pa at 1 m and a received sound level up to 160 dB re 1 μ Pa, by exhibiting generalized avoidance responses and changes to dive behavior during the exposure experiments (CEE) (Goldbogen *et al.*, 2013). However, reactions were not consistent across individuals based on received sound levels alone, and likely were the result of a complex interaction between sound exposure factors such as proximity to sound source and sound type (MFAS simulation vs. pseudo-random noise), environmental conditions, and behavioral state. Surface feeding whales did not show a change in behavior during CEEs, but deep feeding and non-feeding whales showed temporary reactions that quickly abated after sound exposure. Distances of the sound source from the whales during CEEs were sometimes less than a mile. Blue whales have been documented exhibiting a range of foraging strategies for maximizing feeding dependent on the density of their prey at a given location (Goldbogen *et al.*, 2015), so it may be that a temporary behavioral reaction or avoidance of a location where feeding was occurring is not meaningful to the life history of an animal. The findings from Goldbogen *et*

al. (2013) and Melcón *et al.* (2012) are generally consistent with the Navy's criteria and thresholds for predicting behavioral effects to mysticetes from sonar and other active acoustic sources used in the quantitative acoustic effects analysis for GOA. The Navy's behavioral response function predicts the probability of a behavioral response that rises to a Level B harassment take for individuals exposed to a received SPL of 120 dB re 1 μ Pa or greater, with an increasing probability of reaction with increased received level as demonstrated in Melcón *et al.* (2012).

High-frequency systems are notably outside of mysticetes' ideal hearing and vocalization range. Therefore, mysticetes are unlikely to be able to detect higher-frequency systems and these systems would not interfere with their communication or detection of biologically relevant sounds or cause a significant behavioral reaction.

Most Level B harassments to mysticetes from sonar in the Study Area would result from received levels less than 156 dB SPL. Therefore, the majority of Level B harassment takes are expected to be in the form of milder responses (*i.e.*, lower-level exposures that still rise to the level of take, but would likely be less severe in the range of responses that qualify as take) of a generally short duration. As mentioned earlier in this section, we anticipate more severe effects from takes when animals are exposed to higher received levels. Most low-frequency (mysticetes) cetaceans observed in studies usually avoided sound sources at levels of less than or equal to 160 dB re 1 μ Pa. Occasional milder behavioral reactions are unlikely to cause long-term consequences for individual animals or populations. Even if sound exposure were to be concentrated in a relatively small geographic area over a long period of time (*e.g.*, days or weeks during major training exercises), we would expect that some individual whales would avoid areas where exposures to acoustic stressors are at higher levels. For example, Goldbogen *et al.* (2013) indicated some horizontal displacement of deep foraging blue whales in response to simulated MFA sonar. Given these animals' mobility and large ranges, we would expect these individuals to temporarily select alternative foraging sites nearby until the exposure levels in their initially selected foraging area have decreased. Therefore, even temporary displacement from initially selected foraging habitat is not expected to impact the fitness of any individual animals because we would expect equivalent foraging to be available in close proximity. Because we

do not expect any fitness consequences any individual animals, we do not expect any population level effects from these behavioral responses.

As explained above, recovery from a threshold shift (TTS) can take a few minutes to a few days, depending on the exposure duration, sound exposure level, and the magnitude of the initial shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran *et al.*, 2005; Finneran and Schlundt, 2010; Mooney *et al.*, 2009a; Mooney *et al.*, 2009b). However, any threshold shifts experienced would be expected to be relatively small because of the unlikelihood that animals will remain within the ensonified area (due to the short duration of the majority of exercises, the speed of the vessels, and the short distance within which the animal would need to approach the sound source) at high levels for the duration necessary to induce larger threshold shifts. Threshold shifts do not necessarily affect all hearing frequencies equally, so some threshold shifts may not interfere with an animal's hearing of biologically relevant sounds. Furthermore, the implementation of mitigation and the sightability of mysticetes (due to their large size) reduces the potential for a significant behavioral reaction or a threshold shift to occur.

Overall, the number of predicted behavioral reactions is low and occasional behavioral reactions are unlikely to cause long-term consequences for individual animals or populations. This assessment of long-term consequences is based in part on findings from ocean areas where the Navy has been intensively training and testing with sonar and other active acoustic sources for decades. While there are many factors such as the end of large-scale commercial whaling complicating any analysis, there is no data suggesting any long-term consequences to mysticetes from exposure to sonar and other active acoustic sources. On the contrary, there are findings suggesting mysticete populations are increasing in the two primary locations (Southern California and Hawaii) where the Navy's most intensively used range complexes are located. These findings include: (1) Calambokidis *et al.* (2009b) indicating a significant upward trend in abundance of blue whales in Southern California; (2) the recovery of gray whales that migrate through the Navy's SOCAL Range Complex twice a year; (3) work by Moore and Barlow (2011) indicating evidence of increasing fin whale abundance in the California Current

area, which includes the SOCAL Range Complex; (4) the range expansion and increasing presence of Bryde's whales south of Point Conception in Southern California (Kerosky *et al.*, 2012); and (5) the ocean area contained within the Hawaii Range Complex continuing to function as a critical breeding, calving, and nursing area to the point at which the overall humpback whale population in the North Pacific is now greater than some prior estimates of pre-whaling abundance (Barlow *et al.*, 2011).

As discussed in the "Consideration of Time/Area Limitations" section of this rule, a biologically important feeding area has been identified for North Pacific right whale (feeding area) within a small portion of the GOA TMAA (Ferguson *et al.*, 2015). The Navy and NMFS anticipate that proposed training activities likely would have temporal overlap but limited spatial overlap with this BIA. Given the limited spatial overlap, it is unlikely that Navy training would have any biologically meaningful effect on North Pacific right whale feeding behavior in these areas. However, given their small population size, the rarity of their detections and general lack of sightings within the GOA TMAA, and the extremely limited current information about this species, NMFS is requiring a North Pacific right whale "Cautionary Area" between June and September in the overlapping 2,051 km² portion of the North Pacific right whale feeding area, in which no hull-mounted sonar or explosives would be used within the portion of the feeding area that overlaps the Navy's GOA TMAA during those months. In the event of national security needs, the Navy would be required to seek approval in advance from the Commander, U.S. Third Fleet prior to conducting training activities using sonar or explosives. NMFS believes that implementation of this North Pacific right whale Cautionary Area within the GOA TMAA may provide additional protection of this species and stock beyond the mitigation measures already proposed by the Navy, potentially lessening the anticipated impacts even further.

In summary, the GOA TMAA activities are not expected to adversely impact annual rates of recruitment or survival of mysticete whales.

Sperm Whales—The Navy's acoustic analysis indicates that 98 instances of Level B harassment of sperm whales (North Pacific stock) may occur in the Study Area each year from sonar or other active acoustic stressors during training activities. Sperm whales are listed as endangered under the ESA and depleted under the MMPA. There are

currently no reliable abundance estimates for this stock (Muto and Angliss, 2016). Although they believed it to be positively biased, the last estimate (Kato and Miyashita (1998)) was 102,112 sperm whales in the western North Pacific; the number in Alaska waters is unknown. These Level B harassment takes are anticipated to be in the form of TTS and behavioral reactions and no injurious takes of sperm whales from sonar and other active acoustic stressors or explosives were requested or authorized. Sperm whales have shown resilience to acoustic and human disturbance, although they may react to sound sources and activities within a few kilometers. Sperm whales that are exposed to activities that involve the use of sonar and other active acoustic sources may alert, ignore the stimulus, avoid the area by swimming away or diving, or display aggressive behavior (Richardson, 1995; Nowacek, 2007; Southall *et al.*, 2007; Finneran and Jenkins, 2012). Some (but not all) sperm whale vocalizations might overlap with the MFAS/HFAS TTS frequency range, which could temporarily decrease an animal's sensitivity to the calls of conspecifics or returning echolocation signals. However, as noted previously, NMFS does not anticipate TTS of a long duration or severe degree to occur as a result of exposure to MFAS/HFAS. Recovery from a threshold shift (TTS) can take a few minutes to a few days, depending on the exposure duration, sound exposure level, and the magnitude of the initial shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran *et al.*, 2005; Mooney *et al.*, 2009a; Mooney *et al.*, 2009b; Finneran and Schlundt, 2010). Here, any threshold shifts experienced would be expected to be relatively small because of the unlikelihood that animals will remain within the ensonified area (due to the short duration of the majority of exercises, the speed of the vessels, and the short distance within which the animal would need to approach the sound source) at high levels for the duration necessary to induce larger threshold shifts. Threshold shifts do not necessarily affect all hearing frequencies equally, so some threshold shifts may not interfere with an animal's hearing of biologically relevant sounds. No sperm whales are predicted to be exposed to MFAS/HFAS sound levels associated with PTS or injury.

The majority of Level B harassment takes are expected to be in the form of mild responses (low-level exposures)

and of a generally short duration. Relative to the last known population size, the number of anticipated Level B harassment takes is very limited. Because the estimates given above represent the total number of exposures and not necessarily the number of individuals exposed, it is more likely that fewer individuals would be taken, but a subset would be taken more than one time per year. In the ocean, the use of sonar and other active acoustic sources is transient and is unlikely to repeatedly expose the same population of animals over a short period. Overall, the number and nature of predicted behavioral reactions are unlikely to cause long-term consequences for individual animals or populations. The GOA activities are not expected to occur in an area/time of specific importance for reproductive, feeding, or other known critical behaviors for sperm whales, and there is no designated critical habitat in the Study Area. Consequently, the activities are not expected to adversely impact annual rates of recruitment or survival of sperm whales.

Dolphins and Small Whales—The Navy's acoustic analysis predicts the following instances of Level B harassment of delphinids (dolphins and small whales) each year from sonar, other active acoustic sources, and explosives associated with training activities in the Study Area: 389 killer whales (Alaska Resident; Eastern North Pacific Offshore; AT1 Transient; and GOA, Aleutian Island, and Bearing Sea Transient stocks) and 981 Pacific white-sided dolphins (North Pacific stock). These represent a limited number of takes relative to population estimates for delphinid stocks in the Study Area. When the numbers of behavioral takes are compared to the estimated stock abundance and if one assumes that each take happens to a separate animal, less than 15 percent of each of the killer whale stocks and less than 5 percent of the North Pacific stock of Pacific white-sided dolphin would be behaviorally harassed during the course of a year. More likely, slightly fewer individuals would be harassed, but a subset would be harassed more than one time during the course of the year.

All of these takes are anticipated to be in the form of Level B harassment (TTS and behavioral reaction) and no injurious takes of delphinids from sonar and other active acoustic stressors or explosives are requested or proposed for authorization. Further, the majority of takes are anticipated to be by Level B harassment in the form of mild responses. Research and observations show that if delphinids are exposed to

sonar or other active acoustic sources they may react in a number of ways depending on their experience with the sound source and what activity they are engaged in at the time of the acoustic exposure. Delphinids may not react at all until the sound source is approaching within a few hundred meters to within a few kilometers depending on the environmental conditions and species. Delphinids that are exposed to activities that involve the use of sonar and other active acoustic sources may alert, ignore the stimulus, change their behaviors or vocalizations, avoid the sound source by swimming away or diving, or be attracted to the sound source (Richardson, 1995; Nowacek, 2007; Southall *et al.*, 2007; Finneran and Jenkins, 2012).

Research has demonstrated that Alaska Resident killer whales may routinely move over long large distances (Andrews and Matkin, 2014; Fearnbach *et al.*, 2013). In a similar documented long-distance movement, an Eastern North Pacific Offshore stock killer whale tagged off San Clemente Island, California, moved (over a period of 147 days) to waters off northern Mexico, then north to Cook Inlet, Alaska, and finally (when the tag ceased transmitting) to coastal waters off Southeast Alaska (Falcone and Schorr, 2014). Given these findings, temporary displacement due to avoidance of training activities is therefore unlikely to have biological significance to individual animals.

Delphinid species generally travel in large pods and should be visible from a distance, allowing for a high level of mitigation effectiveness, which has been considered quantitatively in the calculation of Level A harassment take, but is also expected to potentially reduce the occurrences of more severe behavioral impacts resulting from higher level exposures. Many of the recorded delphinid vocalizations overlap with the MFAS/HFAS TTS frequency range (2–20 kHz); however, as noted above, NMFS does not anticipate TTS of a serious degree or extended duration to occur as a result of exposure to MFAS/HFAS. Recovery from a threshold shift (TTS) can take a few minutes to a few days, depending on the exposure duration, sound exposure level, and the magnitude of the initial shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran *et al.*, 2005; Finneran and Schlundt, 2010; Mooney *et al.*, 2009a; Mooney *et al.*, 2009b). Here, any threshold shifts experienced would be expected to be relatively small because of the unlikelihood that animals will remain

within the ensonified area (due to the short duration of the majority of exercises, the speed of the vessels, and the short distance within which the animal would need to approach the sound source) at high levels for the duration necessary to induce larger threshold shifts. Threshold shifts do not necessarily affect all hearing frequencies equally, so some threshold shifts may not interfere with an animal's hearing of biologically relevant sounds.

The predicted effects to delphinids are unlikely to cause long-term consequences for individual animals or populations. The GOA TMAA activities are not expected to occur in an area/time of specific importance for reproductive, feeding, or other known critical behaviors for delphinids. Stocks of delphinid species found in the Study Area are not depleted under the MMPA, nor are they listed under the ESA. Consequently, the activities are not expected to adversely impact rates of recruitment or survival of delphinid species.

Porpoises—The Navy's acoustic analysis predicts that 8,270 instances of Level B harassment (TTS and behavioral reactions) of Dall's porpoise (Alaska stock) and 3,705 instances of Level B harassment of harbor porpoise (GOA and Southeast Alaska stocks) may occur each year from sonar and other active acoustic sources and explosives associated with training activities in the Study Area. Acoustic analysis also predicted that 4 Dall's porpoises might be exposed to sound levels from sonar and other active acoustic stressors and explosives likely to result in PTS or injury (Level A harassment). These represent a limited number of takes relative to population estimates for porpoise stocks in the Study Area (Table 6 of the proposed rule (81 FR 9957)). When the numbers of takes for Dall's and harbor porpoise are compared to their respective estimated stock abundances and if one assumes that each take happens to a separate animal, less than 10 percent of the Alaska stock of Dall's porpoise, and less than 10 percent of the GOA and Southeast Alaska stocks of harbor porpoise would be harassed (behaviorally) during the course of a year. Because the estimates given above represent the total number of exposures and not necessarily the number of individuals exposed, it is more likely that fewer individuals would be taken, but a subset would be taken more than one time per year.

Behavioral responses can range from a mild orienting response, or a shifting of attention, to flight and panic (Richardson, 1995; Nowacek, 2007; Southall *et al.*, 2007). The number of

Dall's and harbor porpoise behaviorally harassed by exposure to MFAS/HFAS in the Study Area is generally higher than the other species. For Dall's porpoise, this is due to their high density in the area. For harbor porpoises, this is due to the low Level B harassment threshold (we assume for the purpose of estimating take that all harbor porpoises exposed to 120 dB or higher MFAS/HFAS will be taken by Level B harassment), which essentially makes the ensonified area of effects significantly larger than for the other species. However, the fact that the threshold is a step function and not a curve (and assuming uniform density) means that the vast majority of the takes occur in the very lowest levels that exceed the threshold (it is estimated that approximately 80 percent of the takes are from exposures to 120 dB–126 dB), which means that anticipated behavioral effects are not expected to be severe (*e.g.*, temporary avoidance). As mentioned above, an animal's exposure to a higher received level is more likely to result in a behavioral response that is more likely to adversely affect the health of an animal. Animals that do not exhibit a significant behavioral reaction would likely recover from any incurred costs, which reduces the likelihood of long-term consequences, such as reduced fitness, for the individual or population.

Animals that experience hearing loss (TTS or PTS) may have reduced ability to detect relevant sounds such as predators, prey, or social vocalizations. Some porpoise vocalizations might overlap with the MFAS/HFAS TTS frequency range (2–20 kHz). Recovery from a threshold shift (TTS; partial hearing loss) can take a few minutes to a few days, depending on the exposure duration, sound exposure level, and the magnitude of the initial shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran *et al.*, 2005; Mooney *et al.*, 2009a; Mooney *et al.*, 2009b; Finneran and Schlundt, 2010). More severe shifts may not fully recover and thus would be considered PTS. However, here, any threshold shifts experienced would be expected to be relatively small because of the unlikelihood that animals will remain within the ensonified area (due to the short duration of the majority of exercises, the speed of the vessels, and the short distance within which the animal would need to approach the sound source) at high levels for the duration necessary to induce larger threshold shifts. Threshold shifts do not necessarily affect all hearing frequencies

equally, so some threshold shifts may not interfere with an animal hearing biologically relevant sounds. The likely consequences to the health of an individual that incurs PTS can range from mild to more serious, depending upon the degree of PTS and the frequency band it is in, and many animals are able to compensate for the shift, although it may include energetic costs. Furthermore, likely avoidance of intense activity and sound coupled with mitigation measures would further reduce the potential for severe PTS exposures to occur. If a marine mammal is able to approach a surface vessel within the distance necessary to incur PTS, the likely speed of the vessel (nominal 10–15 knots) would make it very difficult for the animal to remain in range long enough to accumulate enough energy to result in more than a mild case of PTS.

Harbor porpoises have been observed to be especially sensitive to human activity (Tyack *et al.*, 2011; Pirota *et al.*, 2012). The information currently available regarding harbor porpoises suggests a very low threshold level of response for both captive (Kastelein *et al.*, 2000; Kastelein *et al.*, 2005) and wild (Johnston, 2002) animals. Southall *et al.* (2007) concluded that harbor porpoises are likely sensitive to a wide range of anthropogenic sounds at low received levels (approximately 90 to 120 dB). Research and observations of harbor porpoises for other locations show that this small species is wary of human activity and will display profound avoidance behavior for anthropogenic sound sources in many situations at levels down to 120 dB re 1 μ Pa (Southall, 2007). Harbor porpoises routinely avoid and swim away from large motorized vessels (Barlow *et al.*, 1988; Evans *et al.*, 1994; Palka and Hammond, 2001; Polacheck and Thorpe, 1990). The vaquita, which is closely related to the harbor porpoise in the Study Area, appears to avoid large vessels at about 2,995 ft (913 m) (Jaramillo-Legorreta *et al.*, 1999). The assumption is that the harbor porpoise would respond similarly to large Navy vessels, possibly prior to commencement of sonar or explosive activity (*i.e.*, pre-activity avoidance). Harbor porpoises may startle and temporarily leave the immediate area of the training until after the event ends.

ASW training exercises using MFAS/HFAS generally last for 2–16 hours, and may have intervals of non-activity in between. In addition, the Navy does not typically conduct ASW exercises in the same locations. Given the average length of ASW exercises (times of continuous sonar use) and typical vessel speed,

combined with the fact that the majority of porpoises in the Study Area would not likely remain in an area for successive days, it is unlikely that an animal would be exposed to MFAS/HFAS at levels likely to result in a substantive response (*e.g.*, interruption of feeding) that would then be carried on for more than one day or on successive days. Thompson *et al.* (2013) showed that seismic surveys conducted over a 10-day period in the North Sea did not result in the broad-scale displacement of harbor porpoises away from preferred habitat. The harbor porpoises were observed to leave the area at the onset of survey, but returned within a few hours, and the overall response of the porpoises decreased over the 10-day period.

Considering the information above, the predicted effects to Dall's and harbor porpoise are unlikely to cause significant long-term consequences for individual animals or the population (the 4 potential takes by PTS for Dall's porpoise are anticipated to be of a small degree in a narrow frequency band that that would not have significant impacts on individual fitness). The Navy's training activities in the GOA TMAA are not expected to occur in an area/time of specific importance for reproductive, feeding, or other known critical behaviors for Dall's and harbor porpoise. Stocks of Dall's and harbor porpoise are not listed as depleted under the MMPA. Consequently, the activities are not expected to adversely impact annual rates of recruitment or survival of porpoises.

Beaked Whales—Acoustic analysis predicts that 200 Baird's beaked whales (Alaska stock), 1,271 Cuvier's beaked whales (Alaska stock), and 576 Stejneger's beaked whales (Alaska stock) will be taken annually by Level B harassment from exposure to sonar and other active acoustic stressors. These takes are anticipated to be in the form of Level B harassment (mainly all behavioral reaction and only 2 TTS (Cuvier's beaked whale)) and no injurious takes of beaked whales from sonar and other active acoustic stressors or explosives are requested or authorized. Because the estimates given above represent the total number of exposures and not necessarily the number of individuals exposed, it is more likely that fewer individuals would be taken, but a subset would be taken more than one time per year. There are currently no reliable abundance estimates for Alaska stocks of Baird's, Cuvier's, and Stejneger's beaked whales (Muto and Angliss, 2016). However, the ranges of all three stocks are very large compared to the

TMAA (Cuvier's is the smallest, occupying all of the GOA and south of the Canadian border and west past the southern edge of the Kenai peninsula, while Baird's and Stejneger's range even farther south and also cross north over the Kenai peninsula), which means that the impacts anticipated within a miniscule portion of the stocks' ranges and accrued over no more than 21 days would be expected to be relatively small compared to the population.

As is the case with harbor porpoises, beaked whales have been shown to be particularly sensitive to sound and therefore have been assigned a lower harassment threshold based on observations of wild animals by McCarthy *et al.* (2011) and Tyack *et al.* (2011). The fact that the Level B harassment threshold is a step function (the Navy has adopted an unweighted 140 dB re 1 μ Pa SPL threshold for significant behavioral effects for all beaked whales) and not a curve (and assuming uniform density) means that the vast majority of the takes expected to occur in the very lowest levels that exceed the threshold (it is estimated that approximately 80 percent of the takes are from exposures to 140 dB to 146 dB), which means that the anticipated effects for the majority of exposures are not expected to be severe (as mentioned above, an animal's exposure to a higher received level is more likely to result in a behavioral response that is more likely to adversely affect the health of an animal). Further, Moretti *et al.* (2014) recently derived an empirical risk function for Blainville's beaked whale that predicts there is a 0.5 probability of disturbance at a received level of 150 dB (confidence interval: 144–155), suggesting that in some cases the current Navy step function may overestimate the effects of an activity using sonar on beaked whales. Irrespective of the Moretti *et al.* (2014) risk function, NMFS' analysis assumes that all of the beaked whale Level B harassment takes that were proposed for authorization will occur, and we base our negligible impact determination, in part, on the fact that these exposures would mainly occur at the very lowest end of the 140-dB Level B harassment threshold where behavioral effects are expected to be much less severe and generally temporary in nature.

Behavioral responses can range from a mild orienting response, or a shifting of attention, to flight and panic (Richardson, 1995; Nowacek, 2007; Southall *et al.*, 2007; Finneran and Jenkins, 2012). Research has also shown that beaked whales are especially sensitive to the presence of human activity (Tyack *et al.*, 2011; Pirota *et al.*,

2012). Beaked whales have been documented to exhibit avoidance of human activity or respond to vessel presence (Pirota *et al.*, 2012). Beaked whales were observed to react negatively to survey vessels or low altitude aircraft by quick diving and other avoidance maneuvers, and none were observed to approach vessels (Wursig *et al.*, 1998). Some beaked whale vocalizations may overlap with the MFAS/HFAS TTS frequency range (2–20 kHz); however, as noted above, NMFS does not anticipate TTS of a serious degree or extended duration to occur as a result of exposure to MFA/HFAS. Recovery from a threshold shift (TTS) can take a few minutes to a few days, depending on the exposure duration, sound exposure level, and the magnitude of the initial shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran *et al.*, 2005; Mooney *et al.*, 2009a; Mooney *et al.*, 2009b; Finneran and Schlundt, 2010). Here, any threshold shifts experienced would be expected to be relatively small because of the unlikelihood that animals will remain within the ensonified area (due to the short duration of the majority of exercises, the speed of the vessels, and the short distance within which the animal would need to approach the sound source) at high levels for the duration necessary to induce larger threshold shifts. Threshold shifts do not necessarily affect all hearing frequencies equally, so some threshold shifts may not interfere with an animal's hearing of biologically relevant sounds.

It has been speculated for some time that beaked whales might have unusual sensitivities to sonar sound due to their likelihood of stranding in conjunction with MFAS use. Research and observations show that if beaked whales are exposed to sonar or other active acoustic sources they may startle, break off feeding dives, and avoid the area of the sound source to levels of 157 dB re 1 μ Pa, or below (McCarthy *et al.*, 2011). Acoustic monitoring during actual sonar exercises revealed some beaked whales continuing to forage at levels up to 157 dB re 1 μ Pa (Tyack *et al.*, 2011). Stimpert *et al.* (2014) tagged a Baird's beaked whale, which was subsequently exposed to simulated MFAS. Changes in the animal's dive behavior and locomotion were observed when received level reached 127 dB re 1 μ Pa. However, Manzano-Roth *et al.* (2013) found that for beaked whale dives that continued to occur during MFAS activity, differences from normal dive profiles and click rates were not

detected with estimated received levels up to 137 dB re 1 μ Pa while the animals were at depth during their dives. And in research done at the Navy's fixed tracking range in the Bahamas, animals were observed to leave the immediate area of the anti-submarine warfare training exercise (avoiding the sonar acoustic footprint at a distance where the received level was "around 140 dB" SPL, according to Tyack *et al.* (2011)) but return within a few days after the event ended (Claridge and Durban, 2009; Moretti *et al.*, 2009, 2010; Tyack *et al.*, 2010, 2011; McCarthy *et al.*, 2011). Tyack *et al.* (2011) report that, in reaction to sonar playbacks, most beaked whales stopped echolocating, made long slow ascent to the surface, and moved away from the sound. A similar behavioral response study conducted in Southern California waters during the 2010–2011 field season found that Cuvier's beaked whales exposed to MFAS displayed behavior ranging from initial orientation changes to avoidance responses characterized by energetic fluking and swimming away from the source (DeRuiter *et al.*, 2013b). However, the authors did not detect similar responses to incidental exposure to distant naval sonar exercises at comparable received levels, indicating that context of the exposures (*e.g.*, source proximity, controlled source ramp-up) may have been a significant factor. The study itself found the results inconclusive and meriting further investigation. Cuvier's beaked whale responses suggested particular sensitivity to sound exposure as consistent with results for Blainville's beaked whale.

Populations of beaked whales and other odontocetes on the Bahamas and other Navy fixed ranges that have been operating for decades, appear to be stable. Behavioral reactions (avoidance of the area of Navy activity) seem likely in most cases if beaked whales are exposed to anti-submarine sonar within a few tens of kilometers, especially for prolonged periods (a few hours or more) since this is one of the most sensitive marine mammal groups to anthropogenic sound of any species or group studied to date and research indicates beaked whales will leave an area where anthropogenic sound is present (Tyack *et al.*, 2011; De Ruiter *et al.*, 2013; Manzano-Roth *et al.*, 2013; Moretti *et al.*, 2014). Research involving tagged Cuvier's beaked whales in the SOCAL Range Complex reported on by Falcone and Schorr (2012, 2014) indicates year-round prolonged use of the Navy's training and testing area by these beaked whales and has

documented movements in excess of hundreds of kilometers by some of those animals. Given that some of these animals may routinely move hundreds of kilometers as part of their normal pattern, leaving an area where sonar or other anthropogenic sound is present may have little, if any, cost to such an animal. Photo identification studies in the SOCAL Range Complex, a Navy range that is utilized for training and testing more frequently than the GOA TMAA Study Area, have identified approximately 100 individual Cuvier's beaked whale individuals with 40 percent having been seen in one or more prior years, with re-sightings up to 7 years apart (Falcone and Schorr, 2014). These results indicate long-term residency by individuals in an intensively used Navy training and testing area, which may also suggest a lack of long-term consequences as a result of exposure to Navy training and testing activities.

Based on the findings above, it is clear that the Navy's long-term ongoing use of sonar and other active acoustic sources has not precluded beaked whales from also continuing to inhabit those areas. In summary, based on the best available science, the Navy and NMFS believe that any TTS or behavioral responses of beaked whales due to sonar and other active acoustic training activities would generally not have long-term consequences for individuals or populations. NMFS notes that Claridge (2013) speculated that sonar use in a Bahamas range could have "a possible population-level effect" on beaked whales based on lower abundance in comparison to control sites. In summary, Claridge suggested that lower reproductive rates observed at the Navy's Atlantic Undersea Test and Evaluation Center (AUTECE), when compared to a control site, were due to stressors associated with frequent and repeated use of Navy sonar. However, it is important to note that there were some relevant shortcomings of this study. For example, all of the re-sighted whales during the 5-year study at both sites were female, which Claridge acknowledged can lead to a negative bias in the abundance estimation. There was also a reduced effort and shorter overall study period at the AUTECE site that failed to capture some of the emigration/immigration trends identified at the control site. Furthermore, Claridge assumed that the two sites were identical and therefore should have equal potential abundances, when in reality, there were notable physical differences. The author also acknowledged that "information

currently available cannot provide a quantitative answer to whether frequent sonar use at (the Bahamas range) is causing stress to resident beaked whales,” and cautioned that the outcome of ongoing studies “is a critical component to understanding if there are population-level effects.” It is also worth noting that the frequency and intensity of sonar activity at the Bahamas range is greater than in the GOA TMAA, and the bathymetry and other physical characteristics of the training area are different.

Moore and Barlow (2013) have noted a decline in beaked whale populations in a broad area of the Pacific Ocean area out to 300 nm from the coast and extending from the Canadian-U.S. border to the tip of Baja Mexico. There are scientific caveats and limitations to the data used for that analysis, as well as oceanographic and species assemblage changes on the U.S. Pacific coast not thoroughly addressed. Although Moore and Barlow (2013) have noted a decline in the overall beaked whale population along the Pacific coast, in the small fraction of that area where the Navy has been training and testing with sonar and other systems for decades (the Navy’s SOCAL Range Complex), higher densities and long-term residency by individual Cuvier’s beaked whales suggest that the decline noted elsewhere is not apparent where Navy sonar use is most intense. Navy sonar training and testing is not conducted along a large part of the U.S. west coast from which Moore and Barlow (2013) drew their survey data. In Southern California, based on a series of surveys from 2006 to 2008 and a high number encounter rate, Falcone *et al.* (2009) suggested the ocean basin west of San Clemente Island may be an important region for Cuvier’s beaked whales given the number of animals encountered there. Follow-up research (Falcone and Schorr, 2012, 2014) in this same location suggests that Cuvier’s beaked whales may have population sub-units with higher than expected residency, particularly in the Navy’s instrumented Southern California Anti-Submarine Warfare Range. Encounters with multiple groups of Cuvier’s and Baird’s beaked whales indicated not only that they were prevalent on the range where Navy routinely trains and tests, but also that they were potentially present in much higher densities than had been reported for anywhere along the U.S. west coast (Falcone *et al.*, 2009, Falcone and Schorr, 2012). This finding is also consistent with concurrent results from passive acoustic monitoring that

estimated regional Cuvier’s beaked whale densities were higher where Navy trains in the SOCAL training and testing area than indicated by NMFS’ broad scale visual surveys for the U.S. west coast (Hildebrand and McDonald, 2009).

NMFS also considered New *et al.* (2013) and their mathematical model simulating a functional link between foraging energetics and requirements for survival and reproduction for 21 species of beaked whales. However, NMFS concluded that the New *et al.* (2013) model lacks critical data and accurate inputs necessary to form valid conclusions specifically about impacts of anthropogenic sound from Navy activities on beaked whale populations. The study itself notes the need for “future research,” identifies “key data needs” relating to input parameters that “particularly affected” the model results, and states only that the use of the model “in combination with more detailed research” *could* help predict the effects of management actions on beaked whale species. In short, information is not currently available to specifically support the use of this model in a project-specific evaluation of the effects of Navy activities on the impacted beaked whale species in GOA.

No beaked whales are predicted in the acoustic analysis to be exposed to sound levels associated with PTS, other injury, or mortality. After years of the Navy conducting similar activities in the GOA Study Area without incident, NMFS does not expect strandings, injury, or mortality of beaked whales to occur as a result of training activities. Stranding events coincident with Navy MFAS use in which exposure to sonar is believed to have been a contributing factor were detailed in the “Stranding and Mortality” section of the proposed rule (81 FR 9950, 9970–76; February 26, 2016). However, for some of these stranding events, a causal relationship between sonar exposure and the stranding could not be clearly established (Cox *et al.*, 2006). In other instances, sonar was considered only one of several factors that, in their aggregate, may have contributed to the stranding event (Freitas, 2004; Cox *et al.*, 2006). Because of the association between tactical MFAS use and a small number of marine mammal strandings, the Navy and NMFS have been considering and addressing the potential for strandings in association with Navy activities for years. In addition to effective mitigation measures intended to more broadly minimize impacts to marine mammals, the reporting requirements set forth in this rule ensure that NMFS is notified immediately (or as soon as clearance

procedures allow) if a stranded marine mammal is found during or shortly after, and in the vicinity of, any Navy training exercise utilizing MFAS, HFAS, or underwater explosive detonations (see General Notification of Injured or Dead Marine Mammals and the Stranding Response Plan in the regulatory text below). Additionally, through the MMPA process (which allows for adaptive management), NMFS and the Navy will determine the appropriate way to proceed in the event that a causal relationship were to be found between Navy activities and a future stranding.

The GOA training activities are not expected to occur in an area/time of specific importance for reproductive, feeding, or other known critical behaviors for beaked whales. None of the Pacific stocks for beaked whale species found in the Study Area are depleted under the MMPA. The degree of predicted Level B harassment is expected to be mild, and no beaked whales are predicted in the acoustic analysis to be exposed to sound levels associated with PTS, other injury, or mortality. Consequently, the activities are not expected to adversely impact annual rates of recruitment or survival of beaked whales.

Pinnipeds—The Navy’s acoustic analysis predicts that the following numbers of Level B harassment (TTS and behavioral reaction) may occur annually from sonar and other active acoustic stressors associated with training activities: 621 Steller sea lions (Eastern U.S. and Western U.S. stocks); 5 California sea lions (U.S. stock); 713 northern fur seals (Eastern Pacific stock); 122 northern elephant seals (California Breeding stock); and 2 harbor seals (South Kodiak, and Prince William Sound stocks). These represent a limited number of takes relative to population estimates for pinniped stocks in the Study Area. When the numbers of behavioral takes are compared to the estimated stock abundances, less than 1 percent of each of these stocks would be behaviorally harassed during the course of a year. These estimates represent the total number of exposures and not necessarily the number of individuals exposed, as a single individual may be exposed multiple times over the course of a year. Based on the distribution information presented in the LOA application, it is highly unlikely that ribbon seals would be encountered in the Study Area during events involving use of sonar and other active acoustic sources or explosives. The acoustic analysis did not predict any takes of ribbon seals and NMFS is not authorizing any takes of this species.

Research has demonstrated that for pinnipeds, as for other mammals, recovery from a threshold shift (TTS) can take a few minutes to a few days, depending on the exposure duration, sound exposure level, and the magnitude of the initial shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran *et al.*, 2005; Finneran and Schlundt, 2010; Mooney *et al.*, 2009a; Mooney *et al.*, 2009b). However, here, any threshold shifts experienced would be expected to be relatively small because of the unlikelihood that animals will remain within the ensonified area (due to the short duration of the majority of exercises, the speed of the vessels, and the short distance within which the animal would need to approach the sound source) at high levels for the duration necessary to induce larger threshold shifts. Threshold shifts do not necessarily affect all hearing frequencies equally, so threshold shifts may not necessarily interfere with an animal's ability to hear biologically relevant sounds.

Research and observations show that pinnipeds in the water may be tolerant of anthropogenic noise and activity (a review of behavioral reactions by pinnipeds to impulsive and non-impulsive noise can be found in Richardson *et al.*, 1995 and Southall *et al.*, 2007). Available data, though limited, suggest that exposures between approximately 90 and 140 dB SPL do not appear to induce strong behavioral responses in pinnipeds exposed to nonpulse sounds in water (Jacobs and Terhune, 2002; Costa *et al.*, 2003; Kastelein *et al.*, 2006c). Based on the limited data on pinnipeds in the water exposed to multiple pulses (small explosives, impact pile driving, and seismic sources), exposures in the approximately 150 to 180 dB SPL range generally have limited potential to induce avoidance behavior in pinnipeds (Harris *et al.*, 2001; Blackwell *et al.*, 2004; Miller *et al.*, 2004). Zero percent of the takes estimated incidental to the Navy's training activities in the GOA TMAA are expected to result from exposures above 180 dB.

If pinnipeds are exposed to sonar or other active acoustic sources they may react in a number of ways depending on their experience with the sound source and what activity they are engaged in at the time of the acoustic exposure. Pinnipeds may not react at all until the sound source is approaching within a few hundred meters and then may alert, ignore the stimulus, change their behaviors, or avoid the immediate area by swimming away or diving. Houser *et*

al. (2013) performed a controlled exposure study involving California sea lions exposed to a simulated MFAS signal. The purpose of this Navy-sponsored study was to determine the probability and magnitude of behavioral responses by California sea lions exposed to differing intensities of simulated MFAS signals. Behavioral reactions included increased respiration rates, prolonged submergence, and refusal to participate, among others. Younger animals were more likely to respond than older animals, while some sea lions did not respond consistently at any level. Houser *et al.*'s findings are consistent with current scientific studies and criteria development concerning marine mammal reactions to MFAS. Effects on pinnipeds in the Study Area that are taken by Level B harassment, on the basis of reports in the literature as well as Navy monitoring from past activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring). Most likely, individuals will simply move away from the sound source and be temporarily displaced from those areas, or not respond at all.

Although less of an issue here because of the short duration of the activity, it is still worth noting that in areas of repeated and frequent acoustic disturbance, some pinnipeds may habituate or learn to tolerate the new baseline or fluctuations in noise level. Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.*, 2003). While some animals may not return to an area, or may begin using an area differently due to training and testing activities, most animals are expected to return to their usual locations and behavior. Given their documented tolerance of anthropogenic sound (Richardson *et al.*, 1995 and Southall *et al.*, 2007), repeated exposures of individuals (*e.g.*, harbor seals) to levels of sound that may cause Level B harassment are unlikely to result in hearing impairment or to significantly disrupt foraging behavior. As stated above, pinnipeds may habituate to or become tolerant of repeated exposures over time, learning to ignore a stimulus that in the past has not accompanied any overt threat.

Thus, even repeated Level B harassment of some small subset of an overall stock is unlikely to result in any significant realized decrease in fitness to those individuals, and would not result in any adverse impact to the stock as a whole. Evidence from areas where the

Navy extensively trains and tests provides some indication of the possible consequences resulting from those proposed activities. In the confined waters of Washington State's Hood Canal where the Navy has been training and intensively testing for decades and harbor seals are present year-round, the population level has remained stable suggesting the area's carrying capacity likely has been reached (Jeffries *et al.*, 2003; Gaydos *et al.*, 2013). Within Puget Sound there are several locations where pinnipeds use Navy structures (*e.g.*, submarines, security barriers) for haulouts. Given that animals continue to choose these areas for their resting behavior, it would appear there are no long-term effects or consequences to those animals as a result of ongoing and routine Navy activities.

Generally speaking, most pinniped stocks in the Study Area are thought to be stable or increasing (Carretta *et al.*, 2014, 2015). No areas of specific importance for reproduction or feeding for pinnipeds have been identified in the Study Area. Western U.S. stocks of Steller sea lions are listed as endangered under the ESA; however, there is no designated critical habitat for Steller sea lions in the Study Area. As a conservative measure, the GOA TMAA boundary zone was specifically drawn to exclude any nearby critical habitat and associated terrestrial, air, or aquatic zones.

In summary, the activities are not expected to adversely impact annual rates of recruitment or survival of pinniped species.

Long-Term Consequences

The best assessment of long-term consequences from training activities will be to monitor the populations over time within a given Navy range complex. A U.S. workshop on Marine Mammals and Sound (Fitch *et al.*, 2011) indicated a critical need for baseline biological data on marine mammal abundance, distribution, habitat, and behavior over sufficient time and space to evaluate impacts from human-generated activities on long-term population survival. The Navy has developed monitoring plans for protected marine mammals occurring on Navy ranges with the goal of assessing the impacts of training and testing activities on marine species and the effectiveness of the Navy's current mitigation practices. Continued monitoring efforts over time will be necessary to completely evaluate the long-term consequences of exposure to noise sources.

Since 2006 across all Navy range complexes (in the Atlantic, Gulf of

Mexico, and the Pacific), there have been more than 80 reports, including Major Exercise Reports, Annual Exercise Reports, and Monitoring Reports. For the Pacific since 2011, there have been 29 monitoring and exercise reports submitted to NMFS to further research goals aimed at understanding the Navy's impact on the environment as it carries out its mission to train and test.

In addition to this multi-year record of reports from across the Navy, there have also been ongoing Behavioral Response Study research efforts (in Southern California and the Bahamas) specifically focused on determining the potential effects from Navy mid-frequency sonar (Southall *et al.*, 2011, 2012; McCarthy *et al.*, 2011; Tyack *et al.*, 2011; DeRuiter *et al.*, 2013b; Goldbogen *et al.*, 2013; Moretti *et al.*, 2014). This multi-year compendium of monitoring, observation, study, and broad scientific research is informative with regard to assessing the effects of Navy training and testing in general. Given that this record involves many of the same Navy training activities being considered for the Study Area and because it includes all the marine mammal taxonomic families and many of the same species, this compendium of Navy reporting is directly applicable to assessing locations such as the GOA TMAA.

In the Hawaii and Southern California Navy training and testing ranges from 2009 to 2012, Navy-funded marine mammal monitoring research completed over 5,000 hours of visual survey effort covering over 65,000 nautical miles, sighted over 256,000 individual marine mammals, took over 45,600 digital photos and 36 hours of digital video, attached 70 satellite tracking tags to individual marine mammals, and collected over 40,000 hours of passive acoustic recordings. In Hawaii alone between 2006 and 2012, there were 21 scientific marine mammal surveys conducted before, during, or after major exercises. This monitoring effort is consistent with other research from these areas in that there have been no direct evidence demonstration that routine Navy training and testing has negatively impacted marine mammal populations inhabiting these Navy ranges. Continued monitoring efforts over time will be necessary to completely evaluate the long-term consequences of exposure to noise sources. Other research findings related to the general topic of long-term impacts are discussed above in the Species-Specific Analysis.

Based on monitoring conducted before, during, and after Navy training and testing events since 2006, NMFS'

assessment is that it is unlikely there will be impacts having any long-term consequences to populations of marine mammals as a result of the proposed continuation of training activities in the Study Area. In addition to the analysis presented above, this assessment of likelihood is based on four indicators from areas in the Pacific where Navy training and testing has been ongoing for decades: (1) Evidence suggesting or documenting increases in the numbers of marine mammals present (Calambokidis and Barlow, 2004; Falcone *et al.*, 2009; Hildebrand and McDonald, 2009; Falcone and Shorr, 2012; Calambokidis *et al.*, 2009a; Berman-Kowalewski *et al.*, 2010; Moore and Barlow, 2011; Barlow *et al.*, 2011; Kerosky *et al.*, 2012; Smultea *et al.*, 2013; Širović *et al.*, 2015), (2) examples of documented presence and site fidelity of species and long-term residence by individual animals of some species (Hooker *et al.*, 2002; McSweeney *et al.*, 2007; McSweeney *et al.*, 2010; Martin and Kok, 2011; Baumann-Pickering *et al.*, 2012; Falcone and Schorr, 2014), (3) use of training and testing areas for breeding and nursing activities (Littnan, 2010), and (4) 6 years of comprehensive monitoring data indicating a lack of any observable effects to marine mammal populations as a result of Navy training and testing activities.

To summarize, while the evidence covers most marine mammal taxonomic suborders, it is limited to a few species and only suggestive of the general viability of those species in intensively used Navy training and testing areas (Barlow *et al.*, 2011; Calambokidis *et al.*, 2009b; Falcone *et al.*, 2009; Littnan, 2011; Martin and Kok, 2011; McCarthy *et al.*, 2011; McSweeney *et al.*, 2007; McSweeney *et al.*, 2009; Moore and Barlow, 2011; Tyack *et al.*, 2011; Southall *et al.*, 2012a; Melcon, 2012; Goldbogen, 2013; Baird *et al.*, 2013). However, there is no direct evidence that routine Navy training and testing spanning decades has negatively impacted marine mammal populations at any Navy Range Complex. Although there have been a few strandings associated with use of sonar in other locations (see U.S. Department of the Navy, 2013b), Ketten (2012) has recently summarized, "to date, there has been no demonstrable evidence of acute, traumatic, disruptive, or profound auditory damage in any marine mammal as the result of anthropogenic noise exposures, including sonar." Therefore, based on the best available science (Barlow *et al.*, 2011; Carretta *et al.*, 2011; Falcone *et al.*, 2009; Falcone and

Schorr, 2012, 2014; Jeffries *et al.*, 2003; Littnan, 2011; Martin and Kok, 2011; McCarthy *et al.*, 2011; McSweeney *et al.*, 2007; McSweeney *et al.*, 2009; Moore and Barlow, 2011; Tyack *et al.*, 2011; Southall *et al.*, 2012, 2013, 2014; Manzano-Roth *et al.*, 2013; DeRuiter *et al.*, 2013b; Goldbogen *et al.*, 2013; Moretti *et al.*, 2014; Smultea and Jefferson, 2014; Širović *et al.*, 2015), including data developed in the series of more than 80 reports submitted to NMFS, we believe that long-term consequences for individuals or populations are unlikely to result from Navy training activities in the Study Area.

Final Determination

Training activities proposed in the GOA TMAA Study Area would result in mainly Level B and a very small number of Level A harassment takes (for one species), as summarized in Tables 10 and 11. Based on best available science, NMFS concludes that exposures to sound by marine mammal species or stocks due to GOA TMAA activities would result in individuals experiencing primarily short-term (temporary and short in duration) and relatively infrequent effects of the type or severity not expected to be additive. In addition, only a generally small portion of the stocks and species are likely to be exposed.

Marine mammal takes from Navy activities are not expected to impact annual rates of recruitment or survival and will therefore not result in population-level impacts for the following reasons, in summary:

- No mortality is anticipated or authorized, only 4 instances of Level A harassment (resulting in low-level PTS) to Dall's porpoise are likely to occur, and remaining impacts would be within the non-injurious TTS or behavioral effects zones (Level B harassment consisting of generally temporary modifications in behavior).
- As mentioned earlier, an animal's exposure to a higher received level is more likely to result in a behavioral response that is more likely to adversely affect the health of the animal. For low frequency cetaceans (mysticetes) in the Study Area, the majority (73%) of Level B exposures from hull-mounted sonar (which is responsible for most of the take) will occur at received levels less than 162 dB and from sources over 20km away. Only less than 1% of the takes are expected to result from exposures above 174 dB and closer than 4 km. The majority (63%) of estimated odontocete and pinniped takes from hull-mounted MFAS/HFAS result from exposures to received levels less than 162 dB and from sources over 20 km away. Only less than 2% of the takes are expected to result from exposures above 174 dB and closer than 4 km. For other sonar sources, 98% of the takes result from exposures below 168 dB for

all taxa. As noted previously, in addition to received level, the context of exposures (such as the distance) influences how animals respond—for example, beaked whales exposed to the same received level at a greater distance exhibited a lesser behavioral response (DeRuiter *et al.*, 2012). In short, primarily because of the lower levels and greater distances over which most animals are exposed, the majority of Level B harassment takes are expected to be in the form of milder responses (*i.e.*, lower-level exposures that still rise to the level of a take, but would likely be in the less severe range of responses that qualify as a take), and are not expected to have deleterious impacts on the fitness of any individuals.

- Acoustic disturbances caused by Navy sonar and explosives are short-term, intermittent, and (in the case of sonar) transitory. Even when an animal may be exposed to active sonar more than one time, the intermittent nature of the sonar signal, the signal's low duty cycle (MFAS has a typical ping of every 50 seconds), and the fact that both the vessel and animal are moving, provide only a very small chance that exposure to active sonar for individual animals and stocks would be repeated over extended periods of time. Additionally, the exercises will not last more than a total of 21 days annually. Consequently, we would not expect the Navy's activities to create conditions of long-term, continuous underwater noise leading to habitat abandonment or long-term hormonal or physiological stress responses in marine mammal species or stocks.

- Range complexes where intensive training and testing have been occurring for decades have populations of multiple species with strong site fidelity (including highly sensitive resident beaked whales at some locations) and increases in the number of some species. Populations of beaked whales and other odontocetes in the Bahamas, and in other Navy fixed ranges that have been operating for tens of years, appear to be stable.

- Navy monitoring of Navy-wide activities since 2006 has documented hundreds of thousands of marine mammals on the range complexes and there are only two instances of overt behavioral change that have been observed.

- Navy monitoring of Navy-wide activities since 2006 has documented no demonstrable instances of injury to marine mammal species or stocks as a result of non-impulsive acoustic sources.

- In at least three decades of similar Navy activities, only one instance of injury to one species type of marine mammal (In March 2011; three long-beaked common dolphins off Southern California) has occurred as a known result of training or testing using an impulsive source (underwater explosion). Of note, the time-delay firing underwater explosive training activity implicated in the March 2011 incident was not proposed for the training activities in the GOA Study Area.

- The protective measures described in the "Mitigation" section above are designed, and expected, to avoid vessel strike, sound exposures that may cause serious injury, minimize the likelihood of PTS, TTS, or

more severe behavioral responses, further minimize the likelihood of take of North Pacific Right Whales in important feeding areas, and overall to result in the least practicable adverse effect on marine mammal species or stocks.

Based on this analysis of the likely effects of the specified activity on marine mammal species or stocks and their habitat, which includes consideration of the materials provided in the Navy's LOA application and GOA FSEIS/OEIS, and dependent upon the implementation of the mitigation and monitoring measures, NMFS finds that the total marine mammal take from the Navy's training activities in the GOA Study Area will have a negligible impact on the affected marine mammal species or stocks through effects on annual rates of recruitment or survival. NMFS is issuing regulations for these activities in order to prescribe the means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat, and to set forth requirements pertaining to the monitoring and reporting of that taking.

Subsistence Harvest of Marine Mammals

The Tribes nearest the GOA TMAA include the Sun'aq Tribe of Kodiak, the Native Village of Eyak, and the Yakutat Tlingit Tribe; however, these Tribes do not use the TMAA for subsistence. In January 2013, the Navy sent letters to 12 Alaska Native federally-recognized Tribes, including those listed above, with the assistance of the Alaskan Command's Tribal liaison, requesting government-to-government consultation pursuant to Executive Order 13175. The Navy conducted a government-to-government consultation with the Native Village of Eyak and addressed many of the Village's concerns regarding the potential impacts from training activities. All 12 Tribes were also provided a copy of the GOA DSEIS/OEIS for review and comment. Comments on the GOA DSEIS/OEIS were received from the Native Village of Eyak Tribe. In July 2016, Navy held government-to-government consultation with five (5) Alaska Native Tribes in the Kodiak area regarding tribal comments and concerns of the Proposed Action. The Navy considered the concerns of the five Tribes regarding fishery resources and agreed to include a mitigation that precludes the use of ordnance in the Portlock Bank area. The Navy will continue to keep the Tribes informed of the timeframes of future joint training exercises.

There are no relevant subsistence uses of marine mammals implicated by this

action. None of the training activities in the Study Area occur where traditional Arctic subsistence hunting exists. Therefore, NMFS has determined that the total taking would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

There are eight marine mammal species under NMFS jurisdiction that are listed as endangered or threatened under the ESA with confirmed or possible occurrence in the Study Area: Blue whale, fin whale, humpback whale (Western North Pacific DPS and Mexico DPS), sei whale, sperm whale, gray whale (Western North Pacific stock), North Pacific right whale, and Steller sea lion (Western U.S. stock). The Navy consulted with NMFS pursuant to section 7 of the ESA, and NMFS also consulted internally on the issuance of a rule and LOA under section 101(a)(5)(A) of the MMPA for GOA activities. NMFS issued a Biological Opinion concluding that the issuance of the rule and subsequent LOA are likely to adversely affect, but are not likely to jeopardize, the continued existence of the threatened and endangered species under NMFS' jurisdiction and are not likely to result in the destruction or adverse modification of critical habitat in the GOA TMAA Study Area. The Biological Opinion for this action is available on NMFS' Web site (<http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm>).

National Environmental Policy Act

NMFS participated as a cooperating agency on the GOA FSEIS/OEIS, which was published on July 9, 2016, and is available on the Navy's Web site: <http://www.goaeis.com>. NMFS determined that the GOA FSEIS/OEIS is adequate and appropriate to meet our responsibilities under NEPA for the issuance of regulations and LOA and adopted the Navy's GOA FSEIS/OEIS.

Classification

The Office of Management and Budget has determined that this final rule is not significant for purposes of Executive Order 12866.

Pursuant to the Regulatory Flexibility Act (RFA), the Chief Counsel for Regulation of the Department of Commerce certified to the Chief Counsel for Advocacy of the Small Business Administration at the proposed rule stage that this rule would not have a significant economic impact on a substantial number of small entities. The Navy is the sole entity that would be affected by this rulemaking, and the

Navy is not a small governmental jurisdiction, small organization, or small business, as defined by the RFA. Any requirements imposed by an LOA issued pursuant to these regulations, and any monitoring or reporting requirements imposed by these regulations, would be applicable only to the Navy. NMFS does not expect the issuance of these regulations or the associated LOA to result in any impacts to small entities pursuant to the RFA. Because this action directly affects the Navy and not a small entity, NMFS concludes the action will not result in a significant economic impact on a substantial number of small entities. No comments were received regarding this certification. As a result, a regulatory flexibility analysis is not required and none has been prepared.

The Assistant Administrator for Fisheries has determined that there is good cause under the Administrative Procedure Act (5 U.S.C 553(d)(3)) to waive the 30-day delay in the effective date of the measures contained in the final rule. NMFS is unable to accommodate the 30-day delay of effectiveness due to delays resulting from: Late changes in the action (reductions in activity levels), the need for new impact analyses to address policy changes initiated by NMFS (new Acoustic Guidance), and the need to analyze a recent Ninth Circuit opinion regarding section 101(a)(5)(A) of the MMPA. The Navy is the only entity subject to the regulations, and it has informed NMFS that it requests that this final rule take effect by April 2017 to accommodate a Navy training exercise in the GOA planned for May 1, 2017. A waiver of the 30-day delay of the effective date of the final rule will allow the Navy to finalize operational procedures to ensure compliance with required mitigation, monitoring, and reporting requirements, and have MMPA authorization in place to support at-sea joint exercises in the GOA scheduled for May 2017. Any delay of enacting the final rule would result in either: (1) A suspension of planned naval training, which would disrupt vital training essential to national security; or (2) the Navy's procedural non-compliance with the MMPA (should the Navy conduct training without an LOA), thereby resulting in the potential for unauthorized takes of marine mammals. Moreover, the Navy is ready to implement the rule immediately. For these reasons, the Assistant Administrator finds good cause to waive the 30-day delay in the effective date.

List of Subjects in 50 CFR Part 218

Exports, Fish, Imports, Incidental take, Indians, Labeling, Marine mammals, Navy, Penalties, Reporting and recordkeeping requirements, Seafood, Sonar, Transportation.

Dated: April 21, 2017.

Alan D. Risenhoover,

Acting Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR part 218 is amended as follows:

PART 218—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 1. The authority citation for part 218 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.*

■ 2. Subpart P is added to part 218 to read as follows:

Subpart P—Taking and Importing Marine Mammals; U.S. Navy's Gulf of Alaska Temporary Maritime Activities Area (GOA TMAA) Study Area

Sec.

- 218.150 Specified activity and specified geographical region.
- 218.151 Effective dates and definitions.
- 218.152 Permissible methods of taking.
- 218.153 Prohibitions.
- 218.154 Mitigation.
- 218.155 Requirements for monitoring and reporting.
- 218.156 Applications for letters of authorization (LOA).
- 218.157 Letters of authorization (LOA).
- 218.158 Renewal and modifications of letters of authorization (LOA) and adaptive management.

Subpart P—Taking and Importing Marine Mammals; U.S. Navy's Gulf of Alaska Temporary Maritime Activities Area (GOA TMAA) Study Area

§ 218.150 Specified activity and specified geographical region.

(a) Regulations in this subpart apply only to the U.S. Navy for the taking of marine mammals that occurs in the area outlined in paragraph (b) of this section and that occurs incidental to the activities described in paragraph (c) of this section.

(b) The taking of marine mammals by the Navy is only authorized if it occurs within the GOA TMAA Study Area, which is bounded by a hexagon with the following six corners: 57°30' N. lat., 141°30' W. long.; 59°36' N. lat., 148°10' W. long.; 58°57' N. lat., 150°04' W. long.; 58°20' N. lat., 151°00' W. long.; 57°16' N. lat., 151°00' W. long.; and 55°30' N. lat., 142°00' W. long.

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

(1) *Sonar and other active sources used during training*—(i) *Mid-frequency (MF) source classes*. (A) MF1—an average of 271 hours per year.

(B) MF3—an average of 24 hours per year.

(C) MF4—an average of 26 hours per year.

(D) MF5—an average of 126 items per year.

(E) MF6—an average of 11 items per year.

(F) MF11—an average of 39 hours per year.

(ii) *High-frequency (HF) source classes*. (A) HF1—an average of 12 hours per year.

(B) HF6—an average of 40 items per year.

(iii) *Anti-Submarine Warfare (ASW) source classes*. (A) ASW2—an average of 40 hours per year.

(B) ASW3—an average of 273 hours per year.

(C) ASW4—an average 6 items per year.

(iv) *Torpedoes (TORP)*. (A) TORP2—an average of 0 items per year.

(B) [Reserved]

(2) *Impulsive source detonations during training*—(i) *Explosive classes*.

(A) E5 (>5 to 10 pound (lb) net explosive weight (NEW))—an average of 56 detonations per year.

(B) E9 (>100 to 250 lb NEW)—an average of 64 detonations per year.

(C) E10 (>250 to 500 lb NEW)—an average of 6 detonations per year.

(D) E12 (>650 to 1,000 lb NEW)—an average of 2 detonations per year.

(ii) [Reserved]

§ 218.151 Effective dates and definitions.

(a) Regulations in this subpart are effective April 26, 2017 through April 26, 2022.

(b) The following definitions are utilized in these regulations:

(1) *Uncommon Stranding Event (USE)*. A stranding event that takes place during a Major Training Exercise (MTE) and involves any one of the following:

(i) Two or more individuals of any cetacean species (*i.e.*, could be two different species, but not including mother/calf pairs, unless of species of concern listed in next bullet) found dead or live on shore within a three- to four-day period and within 10 miles of one another.

(ii) A single individual or mother/calf pair of any of the following marine mammals of concern: beaked whale of any species, North Pacific right whale, humpback whale, sperm whale, blue

whale, fin whale, sei whale, Cook Inlet beluga whale, Northern fur seal, and Steller sea lion.

(iii) A group of two or more cetaceans of any species exhibiting indicators of distress.

(2) [Reserved]

§ 218.152 Permissible methods of taking.

(a) Under letter of authorization (LOA) issued pursuant to § 216.106 of this chapter and § 218.157, the holder of the LOA may incidentally, but not intentionally, take marine mammals within the area described in § 218.150, provided the activity is in compliance with all terms, conditions, and requirements of these regulations and the LOA.

(b) The activities identified in § 218.150(c) must be conducted in a manner that minimizes, to the greatest extent practicable, any adverse impacts on marine mammal species or stocks and their habitat.

(c) The incidental take of marine mammals under the activities identified in § 218.150(c) is limited to the following species, by the identified method of take and the indicated number of times:

(1) *Level B harassment for all training activities*—(i) *Mysticetes*. (A) Blue whale (*Balaenoptera musculus*), Eastern North Pacific—235 (an average of 47 per year).

(B) Fin whale (*Balaenoptera physalus*), Northeast Pacific—6,455 (an average of 1,291 per year).

(C) Humpback whale (*Megaptera novaeangliae*), Central North Pacific—305 (an average of 61 per year).

(D) Humpback whale (*Megaptera novaeangliae*), Western North Pacific—5 (an average of 1 per year).

(E) Humpback whale (*Megaptera novaeangliae*), CA/OR/WA—35 (an average of 7 per year).

(F) Minke whale (*Balaenoptera acutorostrata*), Alaska—215 (an average of 43 per year).

(G) North Pacific right whale (*Eubalaena japonica*), Eastern North Pacific—15 (an average of 3 per year).

(H) Sei whale (*Balaenoptera borealis*), Eastern North Pacific—30 (an average of 6 per year).

(ii) *Odontocetes*. (A) Baird's beaked whale (*Berardius bairdii*), Alaska—1,000 (an average of 200 per year).

(B) Cuvier's beaked whale (*Ziphius cavirostris*), Alaska—6,355 (an average of 1,271 per year).

(C) Dall's porpoise (*Phocoenoida dalli*), Alaska—41,350 (an average of 8,270 per year).

(D) Harbor porpoise (*Phocoena phocoena*), GOA—13,710 (an average of 2,742 per year).

(E) Harbor porpoise (*Phocoena phocoena*), Southeast Alaska—4,815 (an average of 963 per year).

(F) Killer whale (*Orcinus orca*), Alaska Resident—1,405 (an average of 281 per year).

(G) Killer whale (*Orcinus orca*), Eastern North Pacific Offshore—130 (an average of 26 per year).

(H) Killer whale (*Orcinus orca*), GOA, Aleutian Island, and Bearing Sea Transient—360 (an average of 72 per year).

(I) Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), North Pacific—4,905 (an average of 981 per year).

(J) Stejneger's beaked whale (*Mesoplodon stejnegeri*), Alaska—2,880 (an average of 576 per year).

(K) Sperm whale (*Physeter macrocephalus*), North Pacific—490 (an average of 98 per year).

(iii) *Pinnipeds*. (A) California sea lion (*Zalophus californianus*), U.S.—10 (an average of 2 per year).

(B) Steller sea lion (*Eumetopias jubatus*), Eastern U.S.—1,675 (an average of 335 per year).

(C) Steller sea lion (*Eumetopias jubatus*), Western U.S.—1,430 (an average of 286 per year).

(D) Harbor seal (*Phoca vitulina*), South Kodiak—5 (an average of 1 per year).

(E) Harbor seal (*Phoca vitulina*), Prince William Sound—5 (an average of 1 per year).

(F) Northern elephant seal (*Mirounga angustirostris*), California Breeding—610 (an average of 122 per year).

(G) Northern fur seal (*Callorhinus ursinus*), Eastern Pacific—3,565 (an average of 713 per year).

(2) *Level A harassment for all training activities*—(i) *Odontocetes*. (A) Dall's porpoise (*Phocoenoida dalli*), Alaska—12 (an average of 4 per year).

(B) [Reserved]

(ii) [Reserved]

§ 218.153 Prohibitions.

Notwithstanding takings contemplated in § 218.152 and authorized by an LOA issued under § 216.106 of this chapter and § 218.157, no person in connection with the activities described in § 218.150 may:

(a) Take any marine mammal not specified in § 218.152(c);

(b) Take any marine mammal specified in § 218.152(c) other than by incidental take as specified in § 218.152(c);

(c) Take a marine mammal specified in § 218.152(c) if such taking results in more than a negligible impact on the species or stocks of such marine mammal; or

(d) Violate, or fail to comply with, the terms, conditions, and requirements of these regulations or an LOA issued under § 216.106 of this chapter and § 218.157.

§ 218.154 Mitigation.

(a) After review of best available science, the following mitigation was determined to result in the least practicable adverse effect on marine mammal species or stocks. When conducting training activities, as identified in § 218.150, the mitigation measures contained in the LOA issued under § 216.106 of this chapter and § 218.157 must be implemented. These mitigation measures include, but are not limited to:

(1) *Lookouts*. The Navy shall have two types of lookouts for the purposes of conducting visual observations: Those positioned on ships; and those positioned ashore, in aircraft, or on boats. The following are protective measures concerning the use of lookouts.

(i) Lookouts positioned on surface ships shall be dedicated solely to diligent observation of the air and surface of the water. Their observation objectives shall include, but are not limited to, detecting the presence of biological resources and recreational or fishing boats, observing mitigation zones, and monitoring for vessel and personnel safety concerns.

(ii) Due to manning and space restrictions on aircraft, small boats, and some Navy ships, lookouts for these platforms may be supplemented by the aircraft crew or pilot, boat crew, range site personnel, or shore-side personnel. Lookouts positioned in minimally manned platforms may be responsible for tasks in addition to observing the air or surface of the water (e.g., navigation of a helicopter or small boat). However, all lookouts shall, considering personnel safety, practicality of implementation, and impact on the effectiveness of the activity, comply with the observation objectives described in paragraph (a)(1)(i) of this section for lookouts positioned on ships.

(iii) All personnel standing watch on the bridge, Commanding Officers, Executive Officers, maritime patrol aircraft aircrews, anti-submarine warfare helicopter crews, civilian equivalents, and lookouts shall successfully complete the United States Navy Marine Species Awareness Training prior to standing watch or serving as a lookout.

(iv) *Lookout measures for non-impulsive sound*. (A) With the exception of vessels less than 65 ft (20 m) in length, ships using hull-mounted mid-frequency active sonar sources

associated with anti-submarine warfare activities at sea shall have two Lookouts at the forward position of the vessel.

(B) While using hull-mounted mid-frequency active sonar sources associated with anti-submarine warfare activities at sea, vessels less than 65 ft (20 m) in length shall have one lookout at the forward position of the vessel due to space and manning restrictions.

(C) During non-hull mounted mid-frequency active sonar training activities, Navy aircraft participating in exercises at sea shall conduct and maintain, when operationally feasible and safe, surveillance for marine species of concern as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties. Helicopters shall observe/survey the vicinity of an anti-submarine warfare training event for 10 minutes before the first deployment of active (dipping) sonar in the water.

(D) Ships or aircraft conducting non-hull-mounted mid-frequency active sonar, such as helicopter dipping sonar systems, shall maintain one lookout.

(E) Ships conducting high-frequency active sonar shall maintain one lookout.

(v) *Lookout measures for explosives and impulsive sound.* (A) Aircraft conducting explosive signal underwater sound buoy activities using >0.5–2.5 lb. NEW shall have one lookout.

(B) Surface vessels or aircraft conducting small-, medium-, or large-caliber gunnery exercises against a surface target shall have one Lookout. From the intended firing position, trained Lookouts shall survey the mitigation zone for marine mammals prior to commencement and during the exercise as long as practicable. Towing vessels, if applicable, shall also maintain one Lookout. If a marine mammal is sighted in the vicinity of the exercise, the tow vessel shall immediately notify the firing vessel in order to secure gunnery firing until the area is clear.

(C) Aircraft conducting explosive bombing exercises shall have one lookout and any surface vessels involved shall have trained Lookouts. If surface vessels are involved, Lookouts shall survey for floating kelp and marine mammals. Aircraft shall visually survey the target and buffer zone for marine mammals prior to and during the exercise. The survey of the impact area shall be made by flying at 1,500 ft (460 m) or lower, if safe to do so, and at the slowest safe speed. Release of ordnance through cloud cover is prohibited: Aircraft must be able to actually see ordnance impact areas. Survey aircraft should employ most effective search tactics and capabilities.

(D) When aircraft are conducting missile exercises against a surface target, the Navy shall have one Lookout positioned in an aircraft. Aircraft shall visually survey the target area for marine mammals. Visual inspection of the target area shall be made by flying at 1,500 ft (457 m) or lower, if safe to do so, and at the slowest safe speed. Firing or range clearance aircraft must be able to actually see ordnance impact areas.

(E) Ships conducting explosive and non-explosive gunnery exercises shall have one Lookout on the ship. This may be the same lookout described in paragraph (a)(1)(v)(B) of this section for surface vessels conducting small-, medium-, or large-caliber gunnery exercises when that activity is conducted from a ship against a surface target.

(vi) *Lookout measures for physical strike and disturbance.* (A) While underway, surface ships shall have at least one Lookout with binoculars, and surfaced submarines shall have at least one Lookout with binoculars. Lookouts already posted for safety of navigation and man-overboard precautions may be used to fill this requirement. As part of their regular duties, Lookouts will watch for and report to the Officer of the Deck the presence of marine mammals.

(B) [Reserved]

(vii) *Lookout measures for non-explosive practice munitions.* (A) Gunnery exercises using non-explosive practice munitions (e.g., small-, medium-, and large-caliber) using a surface target shall have one Lookout.

(B) During non-explosive bombing exercises one Lookout shall be positioned in an aircraft and trained lookouts shall be positioned in any surface vessels involved.

(C) When aircraft are conducting non-explosive missile exercises (including exercises using rockets) against a surface target, the Navy shall have one Lookout positioned in an aircraft.

(2) *Mitigation zones.* The following are protective measures concerning the implementation of mitigation zones.

(i) Mitigation zones shall be measured as the radius from a source and represent a distance to be monitored.

(ii) Visual detections of marine mammals or sea turtles within a mitigation zone shall be communicated immediately to a watch station for information dissemination and appropriate action.

(iii) *Mitigation zones for non-impulsive sound.* (A) The Navy shall ensure that hull-mounted mid-frequency active sonar transmission levels are limited to at least 6 dB below normal operating levels if any detected

marine mammals or sea turtles are within 1,000 yd (914 m) of the sonar dome (the bow).

(B) The Navy shall ensure that hull-mounted mid-frequency active sonar transmissions are limited to at least 10 dB below the equipment's normal operating level if any detected marine mammals or sea turtles are within 500 yd (457 m) of the sonar dome.

(C) The Navy shall ensure that hull-mounted mid-frequency active sonar transmissions are ceased if any detected cetaceans or sea turtles are within 200 yd (183 m) and pinnipeds are within 100 yd (90 m) of the sonar dome.

Transmissions shall not resume until the marine mammal has been observed exiting the mitigation zone, is thought to have exited the mitigation zone based on its course and speed, has not been detected for 30 minutes, the vessel has transited more than 2,000 yd (1830 m) beyond the location of the last detection, or 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). Active transmission may resume when dolphins are bow riding because they are out of the main transmission axis of the active sonar while in the shallow-wave area of the ship bow.

(D) The Navy shall ensure that high-frequency and non-hull-mounted mid-frequency active sonar transmission levels are ceased if any detected cetaceans are within 200 yd (183 m) and pinnipeds are within 100 yd (90 m) of the source. Transmissions shall not resume until the marine mammal has been observed exiting the mitigation zone, is thought to have exited the mitigation zone based on its course and speed, the mitigation zone has been clear from any additional sightings for a period of 10 minutes for an aircraft-deployed source, the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a vessel-deployed source, the vessel or aircraft has repositioned itself more than 400 yd (370 m) away from the location of the last sighting, or the vessel concludes that dolphins are deliberately closing in to ride the vessel's bow wave (and there are no other marine mammal sightings within the mitigation zone).

(iv) *Mitigation zones for explosive and impulsive sound.* (A) A mitigation zone with a radius of 350 yd (320 m) shall be established for explosive signal underwater sonobuoys using >0.5 to 2.5 lb NEW. Explosive signal underwater sonobuoys shall not be deployed if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone (around the intended

deployment location). Explosive signal underwater sonobuoy deployment shall cease if a marine mammal is sighted within the mitigation zone. Detonations shall recommence if any one of the following conditions is met: The animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, or the mitigation zone has been clear from any additional sightings for a period of 10 minutes. Passive acoustic monitoring shall also be conducted with Navy assets, such as sonobuoys, already participating in the activity. These assets would only detect vocalizing marine mammals within the frequency bands monitored by Navy personnel. Passive acoustic detections would not provide range or bearing to detected animals, and therefore cannot provide locations of these animals. Passive acoustic detections would be reported to Lookouts posted in aircraft in order to increase vigilance of their visual surveillance.

(B) A mitigation zone with a radius of 200 yd (183 m) shall be established for small- and medium-caliber gunnery exercises with a surface target. The exercise shall not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing shall cease if a marine mammal is sighted within the mitigation zone. Firing shall recommence if any one of the following conditions is met: The animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, the mitigation zone has been clear from any additional sightings for a period of 10 minutes for a firing aircraft, the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a firing ship, or the intended target location has been repositioned more than 400 yd (370 m) away from the location of the last sighting.

(C) A mitigation zone with a radius of 600 yd (549 m) shall be established for large-caliber gunnery exercises with a surface target. The exercise shall not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing shall cease if a marine mammal is sighted within the mitigation zone. Firing shall recommence if any one of the following conditions is met: The animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, or the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

(D) A mitigation zone with a radius of 2,500 yd (2.3 km) around the intended impact location for explosive bombs and 1000 yd (920 m) for non-explosive bombs shall be established for bombing exercises. The exercise shall not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Bombing shall cease if a marine mammal is sighted within the mitigation zone. Bombing shall recommence if any one of the following conditions is met: The animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, or the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

(E) A mitigation zone of 70 yd (64 m) shall be established for all explosive large-caliber gunnery exercises conducted from a ship. The exercise shall not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing shall cease if a marine mammal is sighted within the mitigation zone. Firing shall recommence if any one of the following conditions is met: The animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, the mitigation zone has been clear from any additional sightings for a period of 30 minutes, or the vessel has repositioned itself more than 140 yd (128 m) away from the location of the last sighting.

(v) *Mitigation zones for vessels and in-water devices.* (A) Vessels shall avoid approaching marine mammals head on and shall maneuver to keep at least 500 yd (457 m) away from observed whales and 200 yd (183 m) away from all other marine mammals (except bow riding dolphins), providing it is safe to do so. These requirements shall not apply if a vessel's safety is threatened and to the extent that vessels are restricted in their ability to maneuver. Restricted maneuverability includes, but is not limited to, situations when vessels are engaged in dredging, submerged activities, launching and recovering aircraft or landing craft, minesweeping activities, replenishment while underway and towing activities that severely restrict a vessel's ability to deviate course.

(B) A mitigation zone of 250 yd (229 m) shall be established for all towed in-water devices, providing it is safe to do so.

(vi) *Mitigation zones for non-explosive practice munitions.* (A) A mitigation zone of 200 yd (183 m) shall be established for small-, medium-, and large-caliber gunnery exercises using a

surface target. The exercise shall not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing shall cease if a marine mammal is sighted within the mitigation zone. Firing shall recommence if any one of the following conditions is met: The animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, the mitigation zone has been clear from any additional sightings for a period of 10 minutes for a firing aircraft, the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a firing ship, or the intended target location has been repositioned more than 400 yd (370 m) away from the location of the last sighting.

(B) A mitigation zone of 1,000 yd (920 m) shall be established for bombing exercises. Bombing shall cease if a marine mammal is sighted within the mitigation zone. The exercise shall not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Bombing shall recommence if any one of the following conditions is met: the animal is observed exiting the mitigation zone, the animal is thought to have exited the mitigation zone based on its course and speed, or the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

(3) *Cautionary Areas.* The following are additional measures the Navy shall comply with when conducting training activities in the GOA TMAA Study Area:

(i) The Navy shall avoid training activities using hull-mounted surface ship active sonar and explosive detonations within the North Pacific Right Whale Cautionary Area, defined as the portion of the NMFS-identified biologically important feeding area for North Pacific right whale overlapping the GOA TMAA, except when required by national security needs.

(ii) In the event of national security needs, the Navy shall seek approval in advance from the Commander, U.S. Third Fleet, prior to conducting training activities using hull-mounted active sonar or explosive detonations within the Cautionary Area.

(4) *Stranding response plan.* (i) The Navy shall abide by the letter of the "Stranding Response Plan for the Gulf of Alaska Temporary Maritime Activities Area," to include the following measures:

(A) *Shutdown procedures.* When an Uncommon Stranding Event (USE—defined in § 218.151) occurs during an MTE in the Study Area, the Navy shall

implement the procedures described in paragraphs (a)(4)(i)(A)(1) through (4) of this section:

(1) The Navy shall implement a shutdown when advised by a NMFS Office of Protected Resources Headquarters Senior Official designated in the GOA TMAA Study Area Stranding Communication Protocol that a USE involving live animals has been identified and that at least one live animal is located in the water. NMFS and the Navy shall maintain a dialogue, as needed, regarding the identification of the USE and the potential need to implement shutdown procedures.

(2) Any shutdown in a given area shall remain in effect in that area until NMFS advises the Navy that the subject(s) of the USE at that area die or are euthanized, or that all live animals involved in the USE at that area have left the area (either of their own volition or herded).

(3) If the Navy finds an injured or dead animal floating at sea during an MTE, the Navy shall notify NMFS immediately or as soon as operational security considerations allow. The Navy shall provide NMFS with species or description of the animal(s), the condition of the animal(s), including carcass condition if the animal(s) is/are dead, location, time of first discovery, observed behavior (if alive), and photo or video (if available). Based on the information provided, NMFS shall determine if, and advise the Navy whether a modified shutdown is appropriate on a case-by-case basis.

(4) In the event, following a USE, that qualified individuals are attempting to herd animals back out to the open ocean and animals are not willing to leave, or animals are seen repeatedly heading for the open ocean but turning back to shore, NMFS and the Navy shall coordinate (including an investigation of other potential anthropogenic stressors in the area) to determine if the proximity of mid-frequency active sonar training activities or explosive detonations, though farther than 14 nautical miles from the distressed animal(s), is likely contributing to the animals' refusal to return to the open water. If so, NMFS and the Navy shall further coordinate to determine what measures are necessary to improve the probability that the animals will return to open water and implement those measures as appropriate.

(B) Within 72 hours of NMFS notifying the Navy of the presence of a USE, the Navy shall provide available information to NMFS (per the GOA TMAA Study Area Communication Protocol) regarding the location, number and types of acoustic/explosive sources,

direction and speed of units using mid-frequency active sonar, and marine mammal sightings information associated with training activities occurring within 80 nautical miles (148 km) and 72 hours prior to the USE event. Information not initially available regarding the 80-nautical miles (148-km), 72-hour period prior to the event shall be provided as soon as it becomes available. The Navy shall provide NMFS investigative teams with additional relevant unclassified information as requested, if available.

- (ii) [Reserved]
- (b) [Reserved]

§ 218.155 Requirements for monitoring and reporting.

(a) The Holder of the Authorization must notify NMFS immediately (or as soon as operational security considerations allow) if the specified activity identified in § 218.150 is thought to have resulted in the mortality or injury of any marine mammals, or in any take of marine mammals not identified in § 218.152(c).

(b) The Holder of the LOA must conduct all monitoring and required reporting under the LOA, including abiding by the GOA TMAA monitoring plan.

(c) *General notification of injured or dead marine mammals.* Navy personnel shall ensure that NMFS (regional stranding coordinator) is notified immediately (or as soon as operational security considerations allow) if an injured or dead marine mammal is found by Navy personnel during or shortly after, and in the vicinity of, a Navy training activity utilizing mid- or high-frequency active sonar, or underwater explosive detonations. The Navy shall provide NMFS with species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available). In the event that an injured, stranded, or dead marine mammal is found by the Navy that is not in the vicinity of, or during or shortly after, MFAS, HFAS, or underwater explosive detonations, the Navy shall report the same information as listed in this paragraph (c) as soon as operationally feasible and clearance procedures allow.

(d) *General notification of ship strike.* In the event of a ship strike by any Navy vessel, at any time or place, the Navy shall do the following:

(1) Immediately report to NMFS the species identification (if known), location (lat/long) of the animal (or the strike if the animal has disappeared),

and whether the animal is alive or dead (or unknown), and the time of the strike.

(2) Report to NMFS as soon as operationally feasible the size and length of animal, an estimate of the injury status (ex., dead, injured but alive, injured and moving, unknown, etc.), vessel class/type and operational status.

(3) Report to NMFS the vessel length, speed, and heading as soon as feasible.

(4) Provide NMFS a photo or video, if equipment is available.

(5) Within 2 weeks of the strike, provide NMFS with a detailed description of the specific actions of the vessel in the 30-minute timeframe immediately preceding the strike, during the event, and immediately after the strike (e.g., the speed and changes in speed, the direction and changes in direction, other maneuvers, sonar use, etc., if not classified); a narrative description of marine mammal sightings during the event and immediately after, and any information as to sightings prior to the strike, if available; and use established Navy shipboard procedures to make a camera available to attempt to capture photographs following a ship strike.

(e) *Communication plan.* The Navy and NMFS shall develop a communication plan that will include all of the communication protocols (phone trees, etc.) and associated contact information required for NMFS and the Navy to carry out the necessary expeditious communication required in the event of a stranding or ship strike, including information described in the notification measures in paragraphs (c) and (d) of this section.

(f) *Annual GOA TMAA monitoring report.* The Navy shall submit an annual report of the GOA TMAA monitoring describing the implementation and results from the previous calendar year. Data collection methods shall be standardized across range complexes and study areas to allow for comparison in different geographic locations. The report shall be submitted either 90 days after the calendar year, or 90 days after the conclusion of the monitoring year to be determined by the adaptive management process. The GOA TMAA Monitoring Report may be provided to NMFS within a larger report that includes the required Monitoring Plan reports from multiple range complexes and study areas (the multi-Range Complex Annual Monitoring Report). Such a report would describe progress of knowledge made with respect to monitoring plan study questions across all Navy ranges associated with the Integrated Comprehensive Monitoring Program. Similar study questions shall

be treated together so that progress on each topic shall be summarized across all Navy ranges. The report need not include analyses and content that does not provide direct assessment of cumulative progress on the monitoring plan study questions.

(g) *Annual GOA TMAA exercise reports.* Each year, the Navy shall submit a preliminary report detailing the status of authorized sound sources within 21 days after the anniversary of the date of issuance of the LOA. Each year, the Navy shall submit a detailed report within 3 months after the anniversary of the date of issuance of the LOA. The annual report shall contain information on Major Training Exercises (MTEs) and a summary of all sound sources used, as described in paragraph (g)(3) of this section. The analysis in the detailed report shall be based on the accumulation of data from the current year's report and data collected from previous the report. The detailed reports shall contain information identified in paragraphs (g)(1) through (4) of this section.

(1) *MFAS/HFAS Major Training Exercises.* This section shall contain the following information for Major Training Exercises conducted in the GOA TMAA:

(i) Exercise Information (for each MTE):

(A) Exercise designator.

(B) Date that exercise began and ended.

(C) Location.

(D) Number and types of active sources used in the exercise.

(E) Number and types of passive acoustic sources used in exercise.

(F) Number and types of vessels, aircraft, etc., participating in exercise.

(G) Total hours of observation by lookouts.

(H) Total hours of all active sonar source operation.

(I) Total hours of each active sonar source bin.

(J) Wave height (high, low, and average during exercise).

(ii) Individual marine mammal sighting information for each sighting in each exercise when mitigation occurred:

(A) Date/Time/Location of sighting.

(B) Species (if not possible, indication of whale/dolphin/pinniped).

(C) Number of individuals.

(D) Initial Detection Sensor.

(E) Indication of specific type of platform observation made from (including, for example, what type of surface vessel or testing platform).

(F) Length of time observers maintained visual contact with marine mammal.

(G) Sea state.

(H) Visibility.

(I) Sound source in use at the time of sighting.

(J) Indication of whether animal is <200 yd, 200 to 500 yd, 500 to 1,000 yd, 1,000 to 2,000 yd, or >2,000 yd from sonar source.

(K) *Mitigation implementation.*

Whether operation of sonar sensor was delayed, or sonar was powered or shut down, and how long the delay was.

(L) If source in use is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship (opening, closing, parallel).

(M) *Observed behavior.* Lookouts shall report, in plain language and without trying to categorize in any way, the observed behavior of the animals (such as animal closing to bow ride, paralleling course/speed, floating on surface and not swimming, etc.) and if any calves present.

(iii) An evaluation (based on data gathered during all of the MTEs) of the effectiveness of mitigation measures designed to minimize the received level to which marine mammals may be exposed. This evaluation shall identify the specific observations that support any conclusions the Navy reaches about the effectiveness of the mitigation.

(2) *Summary of sources used.* (i) This section shall include the following information summarized from the authorized sound sources used in all training events:

(A) Total annual hours or quantity (per the LOA) of each bin of sonar or other non-impulsive source; and

(B) Total annual number of each type of explosive exercises and total annual expended/detonated rounds (missiles, bombs, sonobuoys, etc.) for each explosive bin.

(ii) [Reserved]

(3) *Geographic information presentation.* The reports shall present an annual (and seasonal, where practical) depiction of training exercises and testing bin usage geographically across the Study Area.

(h) *MTE prior notification.* The Navy shall submit to NMFS (contact as specified in the LOA and Stranding Plan) an electronic notice of pending MTEs 72 hours prior to the start of the MTE indicating:

(1) Location of the exercise.

(2) Beginning and end dates of the exercise.

(3) Type of exercise.

(i) *Five-year close-out exercise report.* This report shall be included as part of the 2021 annual exercise report. This report shall provide the annual totals for each sound source bin with a comparison to the annual allowance and

the 5-year total for each sound source bin with a comparison to the 5-year allowance. Additionally, if there were any changes to the sound source allowance, this report shall include a discussion of why the change was made and include the analysis to support how the change did or did not result in a change in the SEIS and final rule determinations. The report shall be submitted 3 months after the expiration of this subpart. NMFS shall submit comments on the draft close-out report, if any, within 3 months of receipt. The report shall be considered final after the Navy has addressed NMFS' comments, or 3 months after the submittal of the draft if NMFS does not provide comments.

§ 218.156 Applications for letters of authorization (LOA).

To incidentally take marine mammals pursuant to the regulations in this subpart, the U.S. citizen (as defined by § 216.106 of this chapter) conducting the activity identified in § 218.150(c) (the U.S. Navy) must apply for and obtain either an initial LOA in accordance with § 218.157 or a renewal under § 218.158.

§ 218.157 Letters of authorization (LOA).

(a) An LOA, unless suspended or revoked, shall be valid for a period of time not to exceed the period of validity of this subpart.

(b) Each LOA shall set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact on the species, its habitat, and on the availability of the species for subsistence uses (*i.e.*, mitigation); and

(3) Requirements for mitigation, monitoring and reporting.

(c) Issuance and renewal of the LOA shall be based on a determination that the total number of marine mammals taken by the activity as a whole shall have no more than a negligible impact on the affected species or stock of marine mammal(s).

§ 218.158 Renewals and modifications of letters of authorization (LOA) and adaptive management.

(a) A letter of authorization issued under § 216.106 of this chapter and § 218.157 for the activity identified in § 218.150(c) shall be renewed or modified upon request of the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made

pursuant to the adaptive management provision of this chapter); and

(2) NMFS determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented.

(b) For LOA modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision of this chapter) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), NMFS may publish a notice of proposed LOA in the **Federal Register**, including the associated analysis illustrating the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under § 216.106 of this chapter and § 218.157 for the activity identified in § 218.154 may be modified by NMFS under the following circumstances:

(1) *Adaptive management.* NMFS may modify and augment the existing mitigation, monitoring, or reporting measures (after consulting with the Navy regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, and reporting measures in an LOA:

(A) Results from Navy's monitoring from the previous year(s);

(B) Results from other marine mammal and/or sound research or studies; or

(C) Any information that reveals marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent LOA.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS would publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(2) *Emergencies.* If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in § 218.152(c), an LOA may be modified without prior notification and an opportunity for public comment. Notification would be published in the **Federal Register** within 30 days of the action.

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