# 5 Mitigation

# 5 MITIGATION MEASURES

As part of the Navy's commitment to sustainable use of resources and environmental stewardship, the Navy incorporates measures that are protective of the environment into all of its activities. These include employment of best management practice, standard operating procedures (SOPs), adoption of conservation recommendations, and other measures that mitigate the impacts of Navy activities on the environment. Some of these measures are generally applicable and others are designed to apply to certain geographic areas during certain times of year, for specific types of military training. Mitigation measures covering habitats and species occurring in the Temporary Maritime Activities Area (TMAA) have been developed through various environmental analyses conducted by the Navy for land and sea ranges and adjacent coastal waters.

The Navy has implemented a variety of marine mammal mitigation measures over the last two decades. The following discussion briefly describes the genesis and status of those mitigation measures.

Since the 1990s, the Navy has developed and implemented mitigation measures either as a result of environmental analysis or in consultation with regulatory agencies for research, development, test, and evaluation activities (RDT&E) and training exercises. These measures included visual detection by trained lookouts, power down and shut down procedures, the use of passive sensors to detect marine mammals, and avoidance of marine mammals.

In December 2000, the Navy issued a memorandum entitled "Compliance with Environmental Requirements in the Conduct of Naval Exercises or Training at Sea" (DoN, 2000). This memorandum clarified Navy policy for continued compliance with certain environmental requirements including preparation of environmental planning documents, consultations pursuant to the Endangered Species Act (ESA), and applications for "take" authorizations under the Marine Mammal Protection Act (MMPA).

In 2003, the Navy issued the Protective Measures Assessment Protocol (PMAP) that implemented Navy wide mitigation measures for various types of routine training events. Following the implementation of PMAP, the Navy agreed to additional mitigation measures as part of MMPA authorization and Endangered Species Act (ESA) consultation processes for specific training exercises from 2004-2007.

In order to make the findings necessary to issue the MMPA authorization, it may be necessary for the National Marine Fisheries Service (NMFS) to require additional mitigation or monitoring measures beyond those addressed in this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OE(S) (hereafter referred to as "EIS/OEIS"). These could include measures considered, but eliminated in this EIS/OEIS, or as yet undeveloped measures. In addition to commenting on this EIS/OEIS, the public has had an opportunity to provide information to NMFS through the MMPA process, both during the comment period following NMFS' Notice of Receipt of the application for a Letter of Authorization (LOA), and during the comment period following publication of the proposed rule. NMFS may propose additional mitigation or monitoring measures in the proposed rule. The suite of measures developed to date as a result of those MMPA processes are included and analyzed as part of this section.

Based on NMFS' preliminary determinations reached in the development of the proposed rule associated with the Gulf of Alaska, the Navy anticipates that NMFS will determine that the Final EIS/OEIS adequately analyzes the training activities in the Gulf of Alaska. NMFS is anticipated to adopt the GOA Final EIS/OEIS to support the proposed issuance of the MMPA incidental take regulations, the 2011 LOA, and future LOAs as appropriate. As mentioned above, NMFS must also prescribe regulations that set forth the means of affecting the least practicable adverse impact on affected species or stocks and their habitat (i.e., mitigation measures). This Final EIS/OEIS includes a suite of proposed mitigation measures,

a discussion of mitigation measures that were considered by the Navy and NMFS, but eliminated, and an indication that additional mitigation measures (either not discussed in the Final EIS/OEIS or measures considered but eliminated in the Final EIS/OEIS) may be required by NMFS/Navy Final Rule adaptive management process. As indicated in this Final EIS/OEIS, all alternatives include implementation of mitigation measures, and the analysis of mitigation alternatives will be specifically presented in this chapter of the Final EIS/OEIS.

Additionally, the Navy is engaging in consultation processes under the ESA with regard to listed species that may be affected by the activities described in this EIS/OEIS. For the purposes of the ESA section 7 consultation, the mitigation measures proposed here may be considered by NMFS as beneficial actions taken by the Federal agency or applicant (50 CFR 402.14[g][8]). If required to satisfy requirements of the ESA, NMFS may develop an additional set of measures contained in Reasonable and Prudent Alternatives, Reasonable and Prudent Measures, or Conservation Recommendations in any Biological Opinion issued for this Proposed Action.

The Navy has also considered public comments on proposed mitigation measures described in this EIS/OEIS as indicated in Appendix I.

This chapter describes mitigation measures applicable to military service activities in the TMAA. As previously mentioned, the majority of training activities conducted by the Navy are contained within the TMAA. For Navy training activities that do occur in the inland ranges of the United States (U.S.) Air Force (USAF) and the training lands of the U.S. Army, applicable rules, regulations, safety procedures, standard operating procedures, and mitigation measures of those installations and training areas will be observed by all Navy participants. As such, this chapter focuses on protective measures specific to activities conducted within the TMAA and Warning Area 612 (W-612).

## 5.1 CURRENT REQUIREMENTS AND PRACTICES

### 5.1.1 Air Quality

Emissions that may affect air quality are heavily regulated under the Clean Air Act and its implementing regulations, through a comprehensive federal/state regulatory process (see Section 3.1). Consistent with these regulatory requirements and processes, the Navy has implemented comprehensive air quality management programs to ensure compliance.

### 5.1.2 Expended Materials

Releases or discharges of hazardous materials are heavily regulated through comprehensive federal and state processes. In addition, the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) prohibits certain discharges of oil, garbage, and other substances from vessels. The MARPOL convention is implemented by national legislation, including the Act to Prevent Pollution from Ships (33 U.S.C. 1901, et seq.) and the Federal Water Pollution Control Act ("Clean Water Act"; 33 U.S.C. 1321, et seq.). These and other requirements are implemented by the *Navy Environmental and Natural Resources Program Manual* (DoN 2007) and related Navy guidance documents that require hazardous materials to be stored and handled appropriately, both onshore and afloat.

The Navy has also implemented hazardous materials management programs to ensure compliance and provide guidance on handling and disposing of such materials. Navy instructions include stringent discharge, storage, and pollution prevention measures and require facility managers to reduce, to the extent possible, quantities of toxic substances released into the environment. All Navy vessels and facilities have comprehensive programs in place that implement responsible stewardship, hazardous materials management and minimization, pollution prevention, recycling, and spill prevention and response. These and other programs allow Navy ships to retain used and excess hazardous material on

board for shore offload within 5 working days of arrival at a Navy port. All activities can return excess and unused hazardous materials to the Navy's Hazardous Material Minimization Centers. Additional information regarding water discharge restrictions for Navy vessels is provided in Table 5-1, Water Resources.

### 5.1.3 Water Resources

Environmental compliance policies and procedures applicable to operations ashore and at sea are identified in Navy instructions that include directives regarding waste management, pollution prevention, and recycling. The protective measures implemented by the Navy for water resource protection are commonly referred to as Standard Operating Procedures (SOPs) and Best Management Practices (BMPs). Measures that reduce potential impacts to water resources include creation and adherence to storm water management plans, erosion control, maintaining vegetative buffers adjacent to waterways, and enforcement of pollution permit requirements (National Pollutant Discharge Elimination System [NPDES]).

At sea, Navy vessels are required to operate in a manner that minimizes or eliminates any adverse impacts to the marine environment. Environmental compliance policies and procedures applicable to shipboard operations afloat are defined in the *Navy Environmental and Natural Resources Program Manual* (DoN 2007), Chapter 4, "Pollution Prevention," and Chapter 22, "Environmental Compliance Afloat"; Department of Defense (DoD) Instruction 5000.2-R (§C5.2.3.5.10.8, "Pollution Prevention"). In addition, provisions in Executive Order (EO) 12856, *Federal Compliance With Right-To-Know Laws and Pollution Prevention Requirements*, and EO 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition* reinforce the Clean Water Act's (CWA's) prohibition against discharge of harmful quantities of hazardous substances into or upon U.S. waters out to 200 nautical miles (nm) (371 kilometers [km]), and mandate stringent hazardous waste discharge, storage, dumping, and pollution prevention requirements. Table 5-1 provides information on Navy SOPs and BMPs for shipboard management, storage, and discharge of hazardous materials and wastes, and on other pollution protection measures intended to protect water quality. Although not applicable to the Gulf of Alaska (GOA) Navy Training Activities EIS/OEIS, onshore policies and procedures related to spills of oil and hazardous materials are detailed in OPNAVISNT 5090.1C, Chapter 12.

Shipboard waste-handling procedures governing the discharge of nonhazardous waste streams have been established for commercial and Navy vessels. These categories of wastes include solids (garbage) and liquids such as "black water" (sewage), "gray water" (water from deck drains, showers, dishwashers, laundries, etc.), and oily wastes (oil-water mixtures). Table 5-1 summarizes the waste stream discharge restrictions for Navy vessels at sea.

**Table 5-1: Waste Discharge Restrictions for Navy Vessels**

| Zone (nm from shore) | Type of Waste | |
|---|---|---|
| | **Black Water (Sewage)** | **Gray Water** |
| U.S. Waters (0-3 nm) | No discharge. | If vessel is equipped to collect gray water, pump out when in port. If no collection capability exists, direct discharge permitted. |
| U.S. Contiguous Zone (3-12 nm) | Direct discharge permitted. | Direct discharge permitted. |
| >12 nm from shore | Direct discharge permitted. | Direct discharge permitted. |
| **Zone** | **Oily Waste** | |
| U.S. Waters (0-3 nm) | Discharge allowed if waste has no visible sheen. If equipped with Oil Content Monitor (OCM), discharge < 15 ppm oil. | |
| U.S. Contiguous Zone (3-12 nm) | Same as 0-3 nm. | |
| >12 nm from shore | If equipped with OCM, discharge < 15 ppm oil. Vessels with oil/water separator but no OCM must process all bilge water through the oil-water separator. | |
| **Zone** | **Garbage (Plastic)** | **Garbage (Non-plastic)** |
| U.S. Waters (0-3 nm) | No discharge. | No discharge. |
| U.S. Contiguous Zone (3-12 nm) | No discharge. | Pulped or comminuted food and pulped paper and cardboard waste may be discharged >3nm. |
| 12-25 nm from shore | No discharge. | Bagged shredded glass and metal waste may be discharged >12nm[1] |
| > 25 nm from shore | No discharge. | Direct discharge permitted[2]. |

Note: (1) Submarines may discharge compacted, sinkable garbage between 12 nm and 25 nm provided that the depth of water is greater than 1,000 fathoms.

(2) Surface ships shall use pulpers and shredders for all discharges of food products, paper, cardboard, glass and metal wastes

Source: DoN 2007

### 5.1.4 Acoustic Environment (Airborne)

Navy activities in the TMAA comply with numerous established acoustic control procedures to ensure that neither participants nor non-participants engage in activities that would endanger life or property. SOPs for minimizing airborne noise impacts in the TMAA are mainly centered on aircraft SOPs.

Aircraft SOPs are largely oriented toward safety, which also provide significant noise abatement benefits. For example, many SOPs involve flight routing and minimum altitudes. Each of these procedures increases the range of the noise source from human receptors, thus reducing noise impacts. Additionally, each aircrew will be familiar with the noise profiles of their aircraft and shall be committed to minimizing noise impacts without compromising operational and safety requirements. Flights of naval aircraft shall be conducted so that a minimum of annoyance is experienced by persons that may be below. It is not enough for the pilot to be satisfied that no person is actually endangered. Definite and particular effort shall be taken to fly in such a manner that individuals do not believe they or their property are endangered.

Military personnel who might be exposed to sound in the air from military activities, such as military aircraft or at sea explosions heard on the surface of the ocean, are required to take precautions, such as the wearing of protective equipment, to reduce or eliminate potential harmful effects of such exposure. With regard to potential exposure of non-military personnel in the ocean, precautions are taken pursuant to SOPs to prevent such exposure. These include advance notice of scheduled training activities to the public and the commercial fishing community via the worldwide web, Notices to Mariners (NOTMARs), and Notices to Airmen (NOTAMs). In addition, range safety SOPs ensure that civilians are excluded from, and if necessary removed from areas of military activities, or that military activities do not occur when civilians are present. These procedures have proven to be effective at minimizing potential military / civilian interactions in the course of training or other military activities.

### 5.1.5 Marine Plants and Invertebrates

The Navy has no existing protective measures in place specifically for marine plants and invertebrates. However, Seamount Habitat Protection Areas and Slope Conservation Areas (which comprise HAPCs or generally Conservation Areas) throughout the GOA restrict groundfish harvest to minimize harmful impacts of fishing methodology and equipment to ocean bottom habitat (Witherell 2004). Additionally, marine plants and invertebrates benefit from measures in place to protect marine mammals and sea turtles (see Section 5.2.1).

Subsequently, the buffer zones that have been established to reduce or eliminate potential effects of Navy activities on marine mammals serve to reduce or eliminate potential effects on marine plants and invertebrates as well. The buffer zones for marine mammals have been designated for training events using both explosive and nonexplosive ordnance. Lookouts are posted to visually survey for floating kelp, plants, or algal mats which are objects to which sea turtles and other marine mammals are drawn. For training activities using explosive ordnance, the intended impact area shall not be within 600 yards (yd) (585 meters [m]) of known or observed kelp beds, floating plants, or algal mats. For training events using nonexplosive ordnance, intended impact area shall not be within 200 yd (183 m) of known or observed kelp beds, floating plants, or algal mats. For air-to-surface missile exercises, the buffer zone is extended to 1,800 yd (1,646 m) around hard bottom communities, kelp forests, floating plants, and algal mats, for both explosive and nonexplosive ordnance.

### 5.1.6 Fish

Mitigation measures for at-sea activities involving explosive ordnance, implemented for marine mammals and sea turtles, also offer protections to habitats associated with fish communities. No additional mitigation measures are proposed or warranted because no substantial effects on fish or fish habitat were identified.

### 5.1.7 Birds

The majority of aircraft activities that might affect seabirds are concentrated within the TMAA where the potential for bird aircraft strikes exists. Pursuant to Navy instruction (OPNAVINST 3750.6R), measures to evaluate and reduce or eliminate this hazard to aircraft, aircrews, and birds are implemented during activities in the TMAA. Additionally, guidance involving land or at sea activities involving explosive ordnance contains instructions to personnel to observe the surrounding area within 700 yd (640 m) for 30 minutes prior to detonation. If birds (or marine mammals or sea turtles) are seen, the activity must be relocated to an unoccupied area or postponed until animals leave the area. Monitoring of seabird populations and colonies by conservation groups and researchers is conducted intermittently within coastal areas and offshore islands with limited support from various military commands.

### 5.1.8 Cultural Resources

Section 3.10 details protective measures implemented with regard to cultural resources in the TMAA. There are no prehistoric or historic archaeological resources, architectural resources, or traditional cultural properties identified within the TMAA, but there are submerged cultural resources. Within the TMAA, these submerged cultural resources are unaffected by Navy activities because of the type of training activities and the low density of submerged cultural resources.

The Navy has established protective measures to reduce potential effects on cultural and natural resources from training activities. Some are generally applicable, while others apply to particular geographic areas during specific times of year for certain types of Navy training activities. These measures are based on environmental analyses conducted by the Navy for coastal waters and for land and sea ranges.

Most of these protective measures are focused on protection of the natural environment. Such protective measures also benefit culturally valued natural resources such as salmon and shellfish. Some of the protective measures include use of inert ordnance and passive tracking and acoustical tools, avoidance of sensitive habitats, and visually monitoring areas to ensure significant concentrations of sea life are not present.

### 5.1.9 Transportation and Circulation

The Navy strives to ensure that it retains access to ocean training areas and special use airspace (SUA) as necessary to accomplish its mission, while facilitating joint military-civilian use of such areas to the extent practicable and consistent with safety. These goals of military access, joint use, and safety are promoted through various coordination and outreach measures, including:

- Publication of NOTAMs advising of the status and nature of activities being conducted in the TMAA and Warning Area (W)-612.
- Return of Special-Use Airspace (SUA) to civilian Federal Aviation Administration (FAA) control when not in use for military activities. To accommodate the joint use of SUA, a Letter of Agreement is in place between the military and the Anchorage Air Route Traffic Control Center (ARTCC). The Letter of Agreement defines the conditions and procedures to ensure safe and efficient joint use of the TMAA and Warning Area.
- Publication of NOTMARs and other outreach mechanism. The Navy provides information about training activities planned for the TMAA, for publication by the U.S. Coast Guard in NOTMARs.
- Developing methods of outreach with the fishing community.

### 5.1.10 Socioeconomics

Given the nature and location of Navy activities addressed in this EIS/OEIS, mitigation and protective measures are unnecessary with respect to socioeconomic considerations.

### 5.1.11 Environmental Justice and Protection of Children

Given the nature and location of Navy activities addressed in this EIS/OEIS, mitigation and protective measures are unnecessary with respect to environmental justice and protection of children considerations.

### 5.1.12 Public Safety

Navy activities in the TMAA comply with numerous established safety procedures to ensure the safety of participants and the public. Safety procedures for activities on the offshore and nearshore areas are published in multiple documents (DoN 1997, 1999, 2004) that are applicable to the TMAA. These guidelines are directive for users of the training areas. They provide, among other measures, that:

- Commanders are responsible for ensuring that impact areas and targets are clear prior to commencing activities that are hazardous.
- Aircraft or vessels expending ordnance shall not commence firing without permission of the scheduling authority for their specific range area.
- Firing units and targets must remain in their assigned areas, and units must fire in accordance with current safety instructions.
- Ships are authorized to fire their weapons only in offshore areas and at specific distances from land, depending on the caliber and range of the weapons fired.
- The use of pyrotechnic or illumination devices and marine markers such as smoke or dye markers will be allowed only in the assigned areas, to avoid the launch of Search and Rescue forces when not required. Aircraft carrying ordnance to or from ranges shall avoid populated areas to the maximum extent possible.
- Aircrews operating in the TMAA and W-612 are aware that nonparticipating aircraft are not precluded from entering the area and may not comply with a NOTAM or radio warning that hazardous activities are scheduled or occurring. Aircrews are required to maintain a continuous lookout for non-participating aircraft while operating under Visual Flight Rules (VFRs) in the TMAA or W-612.

In addition to the above-mentioned procedures, the Navy has instituted the following SOPs for use in the TMAA.

#### 5.1.12.1 Aviation Safety

Potential hazardous activities conducted within the TMAA are conducted under VFR and under visual meteorological conditions. This means that the commanders of military aircraft are responsible for the safe conduct of their flight. Prior to releasing any weapons or ordnance, the impact area must be clear of non-participating vessels, people, or aircraft. The Officer Conducting the Exercise (OCE) is ultimately responsible for the safe conduct of range training. A qualified Safety Officer is assigned to each training event or exercises and can terminate activities if unsafe conditions exist.

#### 5.1.12.2 Submarine Safety

Vertical separation of at least 100 ft (30.5 m) is required between the top of a submarine's sail and the depth of a surface ship's keel. If a submarine (or submarine simulated target, the MK-30) is at periscope depth, at least a 1,500 yd (1,372 m) horizontal separation from other vessels must be maintained.

#### 5.1.12.3 Surface Ship Safety

During training events, surface ships maintain radio contact with the OCE. Prior to launching a weapon, ships are required to obtain a "Green Range," which indicates that all safety criteria have been satisfied, and that the weapons and target recovery conditions and recovery helicopters and boats are ready to be employed.

#### 5.1.12.4 Missile Exercise Safety

Safety is the top priority and paramount concern during missile exercises. These exercises can be surface-to-surface, subsurface-to-surface, surface-to-air, or air-to-air. A Missile Exercise (MISSILEX) Letter of Instruction is prepared prior to any missile firing exercise. This instruction establishes precise ground rules for the safe and successful execution of the exercise. Any MISSILEX participant who observes an unsafe situation can communicate a "Red Range" order over any voice communication systems. Range control is in radio contact with participants at all times during a MISSILEX.

## 5.2 MITIGATION MEASURES

As part of the Navy's commitment to sustainable use of resources and environmental stewardship, the Navy incorporates measures that are protective of the environment into all of its activities. These include employment of best management practices, standard operating procedures (SOPs), adoption of conservation recommendations, and other measures that mitigate the impacts of Navy activities on the environment. Some of these measures are generally applicable and others are designed to apply to certain geographic areas during certain times of year, for specific types of military training. Mitigation measures covering habitats and species occurring in the ATA have been developed through various environmental analyses conducted by the Navy for land and sea ranges and adjacent coastal waters.

The Navy has implemented a variety of marine mammal mitigation measures over the last two decades. The following discussion briefly describes the genesis and status of those mitigation measures.

The Navy has developed and implemented mitigation measures as a result of environmental analysis or in consultation with regulatory agencies for research, development, test, and evaluation activities (RDT&E) and training exercises involving various sonar systems. These measures included visual detection by trained lookouts, power down and shut down procedures, the use of passive sensors to detect marine mammals, and avoidance of marine mammals.

In December 2000, the Navy issued a memorandum entitled "Compliance with Environmental Requirements in the Conduct of Naval Exercises or Training at Sea" (DoN 2000). This memorandum clarified Navy policy for continued compliance with certain environmental requirements including preparation of environmental planning documents, consultations pursuant to the Endangered Species Act (ESA), and applications for "take" authorizations under the Marine Mammal Protection Act (MMPA).

In 2003, the Navy issued the Protective Measures Assessment Protocol (PMAP) that implemented Navy-wide mitigation measures for various types of routine training events. Following the implementation of PMAP, the Navy agreed to additional mitigation measures as part of MMPA authorization and ESA consultation processes for specific training exercises from 2004-2007.

This Section describes mitigation measures applicable to the military readiness activities described in Chapter 2 within the study area of the GOA Final EIS/OEIS.

### 5.2.1 Marine Mammals (and Sea Turtles)

The comprehensive suite of mitigation measures implemented by the Navy to reduce impacts to marine mammals also serves to mitigate potential impacts on sea turtles. In particular, personnel and watchstander training, establishment of turtle-free exclusion zones for at-sea explosions, and pre- and post-exercise surveys, all serve to reduce or eliminate potential impacts of Navy activities on sea turtles that may be present in the vicinity.

Effective training in the GOA dictates that ship, submarine, and aircraft participants utilize their sensors and exercise weapons to their optimum capabilities as required by the mission. This section is a comprehensive list of mitigation measures that would be utilized for training activities analyzed in the EIS/OEIS in order to minimize potential for impacts on marine mammals and sea turtles in the GOA.

Marine mammals may be exposed to sound energy levels sufficient to cause a physiological effect. As described in Section 3.8, specific received sound energy levels are associated with permanent threshold shift (PTS), a permanent hearing loss over a subsection of an animal's hearing range (injury); and with temporary threshold shift (TTS), a temporary hearing loss and associated behavioral disruption. Received sound energy level thresholds for PTS and TTS from exposure to mid-frequency sonar are 215 dB re

$1\mu Pa^2$-s and 195dB $1\mu Pa^2$-s respectively. The predicted ranges, or distances, to received sound energy levels associated with marine mammal PTS and TTS for the most powerful and the most commonly used shipboard mid-frequency active sonar used in the Gulf of Alaska are shown in Table 5-2.

Due to spreading loss, sound attenuates logarithmically from the source, so the area in which an animal could be exposed to potential injury (PTS) is small. Because the most powerful sources would typically be used in deep water and the range to effect is limited, spherical spreading is assumed for 195 decibels referenced to 1 micro-Pascal squared second (dB re $1\mu Pa^2$-s) and above. Also, due to the limited ranges, interactions with the bottom or surface ducts are rarely an issue.

**Table 5-2. Range to Effects for Shipboard Mid-Frequency Active Sonar**

| Active Sonar Source | PTS level dB re $1\mu Pa^2$-s | Range to PTS (ft/m) | TTS level dB re $1\mu Pa^2$-s | Range To TTS (ft/m) |
|---|---|---|---|---|
| SQS-53 ship | 215 | 33/10 | 195 | 459/140 |
| SQS-56 ship | 215 | 11/3.2 | 195 | 108/33 |

Current mitigation measures employed by the Navy include applicable training of personnel and implementation of activity specific procedures resulting in minimization and/or avoidance of interactions with protected resources.

#### 5.2.1.1 General Maritime Measures

**Personnel Training – Watchstanders and Lookouts**

The use of shipboard lookouts is a critical component of all Navy mitigation measures. Navy shipboard lookouts (also referred to as "watchstanders") are highly qualified and experienced observers of the marine environment. Their duties require that they report all objects sighted in the water to the Officer of the Deck (OOD) (e.g., trash, a periscope, marine mammals, sea turtles) and all disturbances (e.g., surface disturbance, discoloration) that may be indicative of a threat to the vessel and its crew. There are personnel serving as lookouts on station at all times (day and night) when a ship or surfaced submarine is moving through the water.

- All Commanding Officers (COs), Executive Officers (XOs), lookouts, OODs, Junior OODs (JOODs), maritime patrol aircraft aircrews, and Anti-Submarine Warfare (ASW)/Mine Warfare (MIW) helicopter crews will complete the NMFS-approved Marine Species Awareness Training (MSAT) by viewing the U.S. Navy MSAT digital versatile disk (DVD). MSAT may also be viewed on-line at https://portal.navfac.navy.mil/go/msat. MSAT training must be reviewed at least annually and again prior to the first use of mid-frequency active (MFA) sonar and/or IEER during major ASW exercises (e.g., Composite Training Unit Exercise [COMPTUEX] and Rim of the Pacific Exercise [RIMPAC]). This training must be recorded in the individual's training record.

- Navy lookouts will undertake extensive training to qualify as a watchstander in accordance with the Lookout Training Handbook (Naval Education and Training Command [NAVEDTRA] 12968-D).
- Lookout training will include on-the-job instruction under the supervision of a qualified, experienced watchstander. Following successful completion of this supervised training period, lookouts will complete the Personal Qualification Standard Program, certifying that they have demonstrated the necessary skills (such as detection and reporting of partially submerged objects). Personnel being trained as lookouts can be counted among required lookouts as long as supervisors monitor their progress and performance.

- Lookouts will be trained in the most effective means to ensure quick and effective communication within the command structure to facilitate implementation of mitigation measures if marine species are spotted.
- Lookouts' ability to detect objects in the water, including marine mammals and sea turtles, is critical to Navy environmental compliance and will be evaluated by Navy and contracted biologists.

**Operating Procedures & Collision Avoidance**

- Prior to major exercises, a Letter of Instruction, Mitigation Measures Message or Environmental Annex to the Operational Order will be issued to further disseminate the personnel training requirement and general marine species mitigation measures.
- COs will make use of marine species detection cues and information to limit interaction with marine species to the maximum extent possible consistent with safety of the ship.
- While underway, surface vessels will have at least two lookouts with binoculars; surfaced submarines will 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 OOD the presence of marine mammals and sea turtles.
- On surface vessels equipped with a MFA sonar, pedestal mounted "Big Eye" (20x110) binoculars will be properly installed and in good working order to assist in the detection of marine mammals in the vicinity of the vessel.
- Personnel on lookout will employ visual search procedures employing a scanning methodology in accordance with the Lookout Training Handbook.
- After sunset and prior to sunrise, lookouts will employ Night Lookout Techniques in accordance with the Lookout Training Handbook.
- Personnel on lookout will be responsible for reporting all objects or anomalies sighted in the water (regardless of the distance from the vessel) to the OOD, since any object or disturbance (e.g., trash, periscope, surface disturbance, discoloration) in the water may be indicative of a threat to the vessel and its crew, or indicative of a marine species that may need to be avoided as warranted. Navy environmental compliance relies heavily on the abilities of lookouts to detect and avoid protected species. Therefore, it is critical that lookouts be vigilant in their reporting.
- While in transit, naval vessels will 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 marine animal and can be stopped within a distance appropriate to the prevailing circumstances and conditions.
- When sea turtles or marine mammals have been sighted in the area, Navy vessels will increase vigilance and take reasonable and practicable actions to avoid collisions and activities that might result in close interaction of naval assets and marine mammals. Actions may include changing speed and/or direction and are dictated by environmental and other conditions (e.g., safety, weather).
- Naval vessels will maneuver to keep at least 1,500 ft (500 yds) away from any observed whale in the vessel's path and avoid approaching whales head-on. These requirements do 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. Vessels will take reasonable steps to alert other vessels in the vicinity of the whale. Given rapid swimming speeds and maneuverability of many dolphin species, naval vessels would maintain normal course and speed on sighting dolphins unless some condition indicated a need for the vessel to maneuver.

- Floating weeds and kelp, algal mats, clusters of seabirds, and jellyfish are good indicators of marine mammals. Therefore, where these circumstances are present, the Navy will exercise increased vigilance in watching for marine mammals.
- Navy aircraft participating in exercises at sea will conduct and maintain, when operationally feasible and safe, surveillance for marine mammals as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties. Marine mammal detections will be immediately reported to assigned Aircraft Control Unit for further dissemination to ships in the vicinity of the marine species as appropriate when it is reasonable to conclude that the course of the ship will likely result in a closing of the distance to the detected marine mammal.
- All vessels will maintain logs and records documenting training operations should they be required for event reconstruction purposes.

#### 5.2.1.2 Measures for Specific Training Events

**Mid-Frequency Active Sonar Activities**

**General Maritime Mitigation Measures: Personnel Training**

- All lookouts onboard platforms involved in ASW training events will review the NMFS-approved MSAT material prior to use of MFA sonar.
- All COs, XOs, and officers standing watch on the bridge will have reviewed the MSAT material prior to a training event employing the use of MFA sonar.
- Navy lookouts will undertake extensive training in order to qualify as a watchstander in accordance with the Lookout Training Handbook.
- Lookout training will include on-the-job instruction under the supervision of a qualified, experienced watchstander. Following successful completion of this supervised training period, lookouts will complete the Personal Qualification Standard program, certifying that they have demonstrated the necessary skills (such as detection and reporting of partially submerged objects). This does not forbid personnel being trained as lookouts from being counted as those listed in previous measures so long as supervisors monitor their progress and performance.
- Lookouts will be trained in the most effective means to ensure quick and effective communication within the command structure in order to facilitate implementation of mitigation measures if marine species are spotted.

**General Maritime Mitigation Measures: Lookout and Watchstander Responsibilities**

- On the bridge of surface ships, there will always be at least three people on watch whose duties include observing the water surface around the vessel.
- All surface ships participating in ASW training events will, in addition to the three personnel on watch noted previously, have at all times during the exercise at least two additional personnel on watch as lookouts.

- Personnel on lookout and officers on watch on the bridge will have at least one set of binoculars available for each person to aid in the detection of marine mammals.
- On surface vessels equipped with MFA sonar, pedestal mounted "Big Eye" (20x110) binoculars will be present and in good working order to assist in the detection of marine mammals in the vicinity of the vessel.
- Personnel on lookout will employ visual search procedures employing a scanning methodology in accordance with the Lookout Training Handbook.
- After sunset and prior to sunrise, lookouts will employ Night Lookout Techniques in accordance with the Lookout Training Handbook.
- Personnel on lookout will be responsible for reporting all objects or anomalies sighted in the water (regardless of the distance from the vessel) to the OOD, since any object or disturbance (e.g., trash, periscope, surface disturbance, discoloration) in the water may be indicative of a threat to the vessel and its crew or indicative of a marine species that may need to be avoided as warranted.

**Operating Procedures**

- A Letter of Instruction, Mitigation Measures Message, or Environmental Annex to the Operational Order will be issued prior to the exercise to further disseminate the personnel training requirement and general marine mammal mitigation measures.
- COs and OICs will make use of marine species detection cues and information to limit interaction with marine species to the maximum extent possible, consistent with safety of the ship.
- All personnel engaged in passive acoustic sonar operation (including aircraft, surface ships, or submarines) will monitor for marine mammal vocalizations and report the detection of any marine mammal to the appropriate watch station for dissemination and appropriate action.
- During MFA sonar operations, personnel will utilize all available sensor and optical systems (such as night vision goggles) to aid in the detection of marine mammals.
- Navy aircraft participating in exercises at sea will 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.
- Aircraft with deployed sonobuoys will use only the passive capability of sonobuoys when marine mammals are detected within 200 yd (183 m) of the sonobuoy. Only the sonobuoys that are impacted by the mammal presence within 200 yd (183 m) need to be used in passive mode.
- Marine mammal detections will be immediately reported to assigned Aircraft Control Unit for further dissemination to ships in the vicinity of the marine species, as appropriate, where it is reasonable to conclude that the course of the ship will likely result in a closing of the distance to the detected marine mammal.
- Safety Zones—When marine mammals are detected by any means (aircraft, shipboard lookout, or acoustically) within 1,000 yd (914 m) of the sonar dome (the bow), the ship or submarine will limit active transmission levels to at least 6 decibels (dB) below normal operating levels. (A 6 dB reduction equates to a 75 percent power reduction. The reason is that decibel levels are on a logarithmic scale, not a linear scale. Thus, a 6 dB reduction results in a power level only 25 percent of the original power.)
    - Ships and submarines will continue to limit maximum transmission levels by this 6-dB factor until the animal has been seen to leave the 1,000 yd safety zone, has not been

detected for 30 minutes, or the vessel has transited more than 2,000 yd (1,829 m) beyond the location of the last detection.

- Should a marine mammal be detected within 500 yd (457 m) of the sonar dome, active sonar transmissions will be limited to at least 10 dB below the equipment's normal operating level. (A 10 dB reduction equates to a 90 percent power reduction from normal operating levels.) Ships and submarines will continue to limit maximum ping levels by this 10-dB factor until the animal has been seen to leave the 500 yd safety zone, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yd (1,829 m) beyond the location of the last detection.
- Should the marine mammal be detected within 200 yd (183 m) of the sonar dome, active sonar transmissions will cease. Sonar will not resume until the animal has been seen to leave the 200 yd safety zone, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yd (1,829 m) beyond the location of the last detection.
- Special conditions applicable for dolphins and porpoises only: If, after conducting an initial maneuver to avoid close quarters with dolphins or porpoises, the OOD concludes that dolphins or porpoises are deliberately closing to ride the vessel's bow wave, no further mitigation actions are necessary while the dolphins or porpoises continue to exhibit bow wave riding behavior.
- If the need for power-down should arise as detailed in "Safety Zones" above, the Navy will follow the requirements as though they were operating at 235 dB, the normal operating level (i.e., the first power-down will be to 229 dB, regardless of at what level above 235 dB active sonar was being operated).

- Prior to start up or restart of active sonar, operators will check that the Safety Zone radius around the sound source is clear of marine mammals.
- Active sonar levels (generally)—Navy will operate active sonar at the lowest practicable level, not to exceed 235 dB, except as required to meet tactical training objectives.
- Helicopters will observe/survey the vicinity of an ASW training event for 10 minutes before the first deployment of active (dipping) sonar in the water.
- Helicopters will not dip their active sonar within 200 yd (183 m) of a marine mammal and will cease pinging if a marine mammal closes within 200 yd (183 m) after pinging has begun.
- Submarine sonar operators will review detection indicators of close-aboard marine mammals prior to the commencement of ASW training events involving MFA sonar.
- Night vision goggles will be available to all ships and air crews, for use as appropriate.
- Increased vigilance during major ASW training exercise with tactical active sonar when critical conditions are present.

**Surface-to-Surface Gunnery (up to 5-inch explosive rounds)**

- Lookouts will visually survey for floating weeds and kelp. Intended impact (i.e., where the Navy is aiming) will not be within 600 yd (549 m) of known or observed floating weeds and kelp, and algal mats.
- A 600 yd (549 m) radius buffer zone will be established around the intended target.
- From the intended firing position, lookouts will survey the buffer zone for marine mammals prior to commencement and during the exercise as long as practicable.

- For exercises using targets towed by a vessel or aircraft, target-towing vessels/aircraft will maintain a trained lookout for marine mammals, if applicable. If a marine mammal is sighted in the vicinity, the tow aircraft/vessel will immediately notify the firing vessel, which will suspend the exercise until the area is clear.
- The exercise will be conducted only when the buffer zone is visible and marine mammals are not detected within it.

**Surface-to-Surface Gunnery (nonexplosive rounds)**

- Lookouts will visually survey for floating weeds and kelp, and algal mats. Intended impact will not be within 200 yd (183 m) of known or observed floating weeds and kelp, and algal mats.
- A 200 yd (183 m) radius buffer zone will be established around the intended target.
- From the intended firing position, trained lookouts will survey the buffer zone for marine mammals prior to commencement and during the exercise as long as practicable.
- If applicable, target towing vessels will maintain a lookout. If a marine mammal is sighted in the vicinity of the exercise, the tow vessel will immediately notify the firing vessel in order to secure gunnery firing until the area is clear.
- The exercise will be conducted only when the buffer zone is visible and marine mammals are not detected within the target area and the buffer zone.

**Surface-to-Air Gunnery (explosive and nonexplosive rounds)**

- Vessels will orient the geometry of gunnery exercises in order to prevent military expended material from falling in the area of sighted marine mammals.
- Vessels will expedite the recovery of any parachute deploying aerial targets to reduce the potential for entanglement of marine mammals.
- Target towing aircraft will maintain a lookout, if applicable. If a marine mammal is sighted in the vicinity of the exercise, the tow aircraft will immediately notify the firing vessel in order to secure gunnery firing until the area is clear.

**Air-to-Surface Gunnery (explosive and nonexplosive rounds)**

- If surface vessels are involved, lookouts will visually survey for floating kelp in the target area. Impact will not occur within 200 yd (183 m) of known or observed floating weeds and kelp or algal mats.
- A 200 yd (183 m) radius buffer zone will be established around the intended target.
- If surface vessels are involved, lookout(s) will visually survey the buffer zone for marine mammals prior to and during the exercise.
- Aerial surveillance of the buffer zone for marine mammals will be conducted prior to commencement of the exercise. Aircraft crew/pilot will maintain visual watch during exercises. Release of ordnance through cloud cover is prohibited, aircraft must be able to actually see ordnance impact areas.
- The exercise will be conducted only if marine mammals are not visible within the buffer zone.

**Air-to-Surface At-Sea Bombing Exercises (explosive and nonexplosive bombs)**

- If surface vessels are involved, trained lookouts will survey for floating kelp and marine mammals. Ordnance will not be targeted to impact within 1,000 yd (914 m) of known or observed floating kelp or marine mammals.
- A 1,000 yd (914 m) radius buffer zone will be established around the intended target.
- Aircraft will visually survey the target and buffer zone for marine mammals prior to and during the exercise. The survey of the impact area will be made by flying at 1,500 ft (457 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 exercises will be conducted only if marine mammals are not visible within the buffer zone.

**Air-to-Surface Missile Exercises (explosive and nonexplosive)**

- Ordnance will not be targeted to impact within 1,800 yd (1,646 m) of known or observed floating kelp.
- Aircraft will visually survey the target area for marine mammals. Visual inspection of the target area will 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. Explosive ordnance will not be targeted to impact within 1,800 yd (1646 m) of sighted marine mammals.

**Sinking Exercise (SINKEX)**

The selection of sites suitable for SINKEX involves a balance of operational suitability and requirements established under the Marine Protection, Research and Sanctuaries Act (MPRSA) permit granted to the Navy (40 Code of Federal Regulations § 229.2). To meet operational suitability criteria, locations must be within a reasonable distance of the target vessels' originating locations. The locations should also be close to active military bases to allow participating assets access to shore facilities. For safety purposes, these locations should also be in areas that are not generally used by non-military air or watercraft. The MPRSA permit requires vessels to be sunk in waters which are at least 1,000 fathoms (6,000 ft [2,000 yds/1,829 m]) deep and at least 50 nm (92.6 km) from land.

In general, most marine mammals prefer areas with strong bathymetric gradients and oceanographic fronts for significant biological activity such as feeding and reproduction. Typical locations include the continental shelf and shelf-edge.

***SINKEX Mitigation Plan***

The Navy has developed range clearance procedures to maximize the probability of sighting any ships or marine mammals in the vicinity of an exercise, which are as follows:

- All weapons firing will be conducted during the period one hour after official sunrise to 30 minutes before official sunset.
- Extensive range clearance operations would be conducted in the hours prior to commencement of the exercise, ensuring that no shipping is located within the hazard range of the longest-range weapon being fired for that event.
- An exclusion zone with a radius of 1.5 nm will be established around each target. This 1.5 nm zone includes a buffer of 0.5 nm to account for errors, target drift, and animal movement. In addition to the 1.5 nm exclusion zone, a further safety zone, which extends from the exclusion

zone at 1.5 nm out an additional 0.5 nm, will be surveyed. Together, the zones (exclusion and safety) extend out 2 nm from the target.

- A series of surveillance over-flights will be conducted within the exclusion and the safety zones, prior to and during the exercise, when feasible. Survey protocol will be as follows:
    - Overflights within the exclusion zone will be conducted in a manner that optimizes the surface area of the water observed. This may be accomplished through the use of the Navy's Search and Rescue Tactical Aid, which provides the best search altitude, ground speed, and track spacing for the discovery of small, possibly dark objects in the water based on the environmental conditions of the day. These environmental conditions include the angle of sun inclination, amount of daylight, cloud cover, visibility, and sea state.
    - All visual surveillance activities will be conducted by Navy personnel trained in visual surveillance. At least one member of the mitigation team will have completed the Navy's marine mammal training program for lookouts.
    - In addition to the overflights, the exclusion zone will be monitored by passive acoustic means when assets are available. This passive acoustic monitoring would be maintained throughout the exercise. Potential assets include sonobuoys, which can be utilized to detect any vocalizing marine mammals (particularly sperm whales) in the vicinity of the exercise. The sonobuoys will be re-seeded as necessary throughout the exercise. Additionally, passive sonar onboard submarines may be utilized to detect any vocalizing marine mammals in the area. The OCE would be informed of any aural detection of marine mammals and would include this information in the determination of when it is safe to commence the exercise.
    - On each day of the exercise, aerial surveillance of the exclusion and safety zones will commence two hours prior to the first firing.
    - The results of all visual, aerial, and acoustic searches will be reported immediately to the OCE. No weapons launches or firing may commence until the OCE declares the safety and exclusion zones free of marine mammals.
    - If a protected species observed within the exclusion zone is diving, firing will be delayed until the animal is re-sighted outside the exclusion zone, or 30 minutes have elapsed. After 30 minutes, if the animal has not been re-sighted it would be assumed to have left the exclusion zone.
    - During breaks in the exercise of 30 minutes or more, the exclusion zone will again be surveyed for any protected species. If marine mammals are sighted within the exclusion zone, the OCE would be notified, and the procedure described above would be followed.
    - Upon sinking of the vessel, a final surveillance of the exclusion zone will be monitored for two hours, or until sunset, to verify that no marine mammals were harmed.
- Aerial surveillance will be conducted using helicopters or other aircraft based on necessity and availability. The Navy has several types of aircraft capable of performing this task; however, not all types are available for every exercise. For each exercise, the available asset best suited for identifying objects on and near the surface of the ocean would be used. These aircraft would be capable of flying at the slow safe speeds necessary to enable viewing of marine vertebrates with unobstructed, or minimally obstructed, downward and outward visibility. The exclusion and safety zone surveys may be cancelled in the event that a mechanical problem, emergency search and rescue, or other similar and unexpected event preempts the use of one of the aircraft onsite for the exercise.

- Where practicable, the Navy will conduct the exercise in sea states that are ideal for marine mammal sighting, i.e., Beaufort Sea State Level 3 or less. In the event of a Level 4 or above, survey efforts will be increased within the exercise area. This will be accomplished through the use of an additional aircraft, if available, and conducting tight search patterns.
- The exercise will not be conducted unless the exclusion zone can be adequately monitored visually.
- In the event that any marine mammals are observed to be harmed in the area, a detailed description of the animal will be taken, the location noted, and if possible, photos taken. This information will be provided to NMFS via the Navy chain of command for purposes of identification (see the Stranding Plan for detail).
- An after action report detailing the exercise time line, the time the surveys commenced and terminated, amount, and types of all ordnance expended, and the results of survey efforts for each event will be submitted to NMFS.

**Mitigation Measures Related to Explosive Source Sonobuoys (AN/SSQ-110A)**

**AN/SSQ-110A Pattern Deployment**

- Crews will conduct visual reconnaissance of the drop area prior to laying their intended sonobuoy pattern. This search will be conducted below 1,500 ft (457 m) at a slow speed, if operationally feasible and weather conditions permit. In dual aircraft operations, crews are allowed to conduct coordinated area clearances.
- Crews will conduct a minimum of 30 minutes of visual and aural monitoring of the search area prior to commanding the first post (source/receiver sonobuoy pair) detonation. This 30-minute observation period may include pattern deployment time.
- For any part of the briefed pattern where a post (source/receiver sonobuoy pair) will be deployed within 1,000 yd (914 m) of observed marine mammal activity, the Navy will deploy the receiver ONLY and monitor while conducting a visual search. When marine mammals are no longer detected within 1,000 yd (914 m) of the intended post position, the Navy will co-locate the explosive source sonobuoys (AN/SSQ-110A) (source) with the receiver.
- When able, Navy crews will conduct continuous visual and aural monitoring of marine mammal activity. This is to include monitoring of aircraft sensors from first sensor placement to checking off-station and out of Radio Frequency (RF) range of these sensors.

**AN/SSQ-110A Pattern Employment**

- Aural Detection:
    - If the presence of marine mammals is detected aurally, then that will cue the Navy aircrew to increase the diligence of their visual surveillance.
    - Subsequently, if no marine mammals are visually detected, then the crew may continue multi-static active search.
- Visual Detection:

  If marine mammals are visually detected within 1,000 yd (914 m) of the explosive source sonobuoys (AN/SSQ-110A) intended for use, then that payload will not be detonated. Aircrews may utilize this post once the marine mammals have not been re-sighted for 30 minutes, or are observed to have moved outside the 1,000 yd (914 m) safety buffer. Aircrews may shift their multi-static active search to another post where marine mammals are outside the 1,000 yd (914 m) safety buffer.

**AN/SSQ-110A Scuttling Sonobuoys**

- Aircrews will make every attempt to manually detonate the unexploded charges at each post in the pattern prior to departing the operations area by using the "Payload 1 Release" command, followed by the "Payload 2 Release" command. Aircrews will refrain from using the "Scuttle" command when two payloads remain at a given post. Aircrews will ensure a 1,000 yd (914 m) safety buffer, visually clear of marine mammals, is maintained around each post as is done during active search operations.
- Aircrews will only leave posts with unexploded charges in the event of a sonobuoy malfunction, an aircraft system malfunction, or when an aircraft must immediately depart the area due to issues such as fuel constraints, inclement weather, and in-flight emergencies. In these cases, the sonobuoy will self-scuttle using the secondary or tertiary method.
- The Navy will ensure all payloads are accounted for. Explosive source sonobuoys (AN/SSQ-110A) that cannot be scuttled will be reported as unexploded ordnance via voice communications while airborne, then upon landing via naval message.
- Mammal monitoring will continue until out of own-aircraft sensor range.

#### 5.2.1.3 Conservation Measures

**Monitoring: Integrated Comprehensive Monitoring Program**

The U.S. Navy is committed to demonstrating environmental stewardship while executing its National Defense mission and is responsible for compliance with a suite of federal environmental and natural resources laws and regulations that apply to the marine environment. As part of those responsibilities, an assessment of the long-term and/or population-level effects of Navy training activities as well as the efficacy of mitigation measures is necessary. The Navy is developing an Integrated Comprehensive Monitoring Program (ICMP) for marine species in order to assess the effects of training activities on marine species and investigate population trends in marine species distribution and abundance in various range complexes and geographic locations where Navy training occurs. This program will emphasize active sonar training.

The primary goals of the ICMP are to:

- Monitor Navy training events, particularly those involving MFA sonar and at sea explosions, for compliance with the terms and conditions of Endangered Species Act (ESA) Section 7 consultations or Marine Mammal Protection Act (MMPA) authorizations;
- Collect data to support estimating the number of individuals exposed to sound levels above current regulatory thresholds;
- Assess the efficacy of the Navy's current marine species mitigation;
- Add to the knowledge base on potential behavioral and physiological effects to marine species from mid-frequency active sonar and at-sea explosions; and,
- Assess the practicality and effectiveness of a number of mitigation tools and techniques (some not yet in use).

**Adaptive Management**

Adaptive management principles consider appropriate adjustments to mitigation, monitoring, and reporting as the outcomes of the proposed actions and required mitigation are better understood. NMFS includes adaptive management principles in the regulations for the implementation of the proposed action, and any adaptive adjustments of mitigation and monitoring would be led by NMFS via the MMPA process and developed in coordination with the Navy. Continued opportunity for public input would be

included via the MMPA process, as appropriate (i.e. via the "Letter of Authorization" process). The intent of adaptive management here is to ensure the continued proper implementation of the required mitigation measures, to conduct appropriate monitoring and evaluation efforts, and to recommend possible adjustments to the mitigation/monitoring/reporting to accomplish the established goals of the mitigation and monitoring which include:

***Mitigation***

- Avoidance or minimization of injury or death of marine mammals wherever possible,
- A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of sound associated with the proposed active sonar activities,
- A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to received levels,
- A reduction in the intensity of exposures (either total number or number at biologically important time or location) to received levels,
- A reduction in effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time, and
- For monitoring directly related to mitigation—an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation measures (shut-down zone, etc.).

***Monitoring***

- An increase in the probability of detecting marine mammals, both within the safety zone (thus allowing for more effective implementation of the mitigation) and in general to generate more data to contribute to the effects analyses.
- An increase in our understanding of how many marine mammals are likely to be exposed to levels of MFA sonar/High-Frequency Active (HFA) sonar (or explosives or other stimuli) that we associate with specific adverse effects, such as behavioral harassment, Temporary Threshold Shift (TTS), or Permanent Threshold Shift (PTS).
- An increase in our understanding of how marine mammals respond to MFA sonar/HFA sonar (at specific received levels), explosives, or other stimuli expected to result in take and how anticipated adverse effects on individuals (in different ways and to varying degrees) may impact the population, species, or stock (specifically through effects on annual rates of recruitment or survival).
- An increased knowledge of the affected species.
- An increase in our understanding of the effectiveness of certain mitigation and monitoring measures.

Generally speaking, adaptive management supports the integration of NEPA's principles into the ongoing implementation and management of the Proposed Action, including a process for improving, where needed, the effectiveness of the identified mitigations. Note that any adjustment of mitigation and monitoring would be within the scope of the environmental analyses and considerations presented in this EIS/OEIS.

### Research

The Navy provides a significant amount of funding and support to marine research. In the past 5 years the agency funded over $100 million ($26 million in Fiscal Year [FY] 08 alone) to universities, research institutions, federal laboratories, private companies, and independent researchers around the world to study marine mammals. The U.S. Navy 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. Major topics of Navy-supported research include the following:

- Better understanding of marine species distribution and important habitat areas,
- Developing methods to detect and monitor marine species before and during training,
- Understanding the effects of sound on marine mammals, sea turtles, fish, and birds, and
- Developing tools to model and estimate potential effects of sound.

This research is directly applicable to Fleet training activities, particularly with respect to the investigations of the potential effects of underwater noise sources on marine mammals and other protected species. Proposed training activities employ active sonar and at-sea explosions, which introduce sound into the marine environment.

The Marine Life Sciences Division of the Office of Naval Research currently coordinates six programs that examine the marine environment and are devoted solely to studying the effects of noise and/or the implementation of technology tools that will assist the Navy in studying and tracking marine mammals. The six programs are as follows:

- Environmental Consequences of Underwater Sound,
- Non-Auditory Biological Effects of Sound on Marine Mammals,
- Effects of Sound on the Marine Environment,
- Sensors and Models for Marine Environmental Monitoring,
- Effects of Sound on Hearing of Marine Animals, and
- Passive Acoustic Detection, Classification, and Tracking of Marine Mammals.

The Navy has also developed the technical reports referenced within this document, including the Marine Resource Assessment. Furthermore, research cruises by the National Marine Fisheries Service (NMFS) and by academic institutions have received funding from the U.S. Navy. For example, in April 2009, the Navy funded a vessel-based line-transect survey in the GOA on board the NOAA ship *Oscar Dyson* to determine marine mammal species distribution and abundance. The survey cruise employed multiple observation techniques, including visual and passive acoustic observations, as well as photographic identifications (Rone et al. 2009).

The Navy has sponsored several workshops to evaluate the current state of knowledge and potential for future acoustic monitoring of marine mammals. The workshops brought together acoustic experts and marine biologists from the Navy and other research organizations to present data and information on current acoustic monitoring research efforts and to evaluate the potential for incorporating similar technology and methods on instrumented ranges. However, acoustic detection, identification, localization, and tracking of individual animals still requires a significant amount of research effort to be considered a reliable method for marine mammal monitoring. The Navy supports research efforts on acoustic monitoring and will continue to investigate the feasibility of passive acoustics as a potential mitigation and monitoring tool.

Overall, the Navy will continue to fund ongoing marine mammal research, and is planning to coordinate long term monitoring/studies of marine mammals on various established ranges and operating areas. The Navy will continue to research and contribute to university/ external research to improve the state of the science regarding marine species biology and acoustic effects. These efforts include mitigation and monitoring programs; data sharing with NMFS and via literature for research and development efforts; and future research as described previously.

#### 5.2.1.4 Monitoring: GOA TMAA Marine Species Monitoring Plan

The U.S. Navy has developed a GOA TMAA Monitoring Plan to provide marine mammal and sea turtle monitoring as required under the MMPA of 1972 and the ESA of 1973. In order to issue an Incidental Take Authorization (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". The MMPA implementing regulations at 50 CFR Section 216.104 (a) (13) note that requests for Letters of Authorization (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.

The GOA TMAA Monitoring Plan proposes monitoring goals for marine mammals that are unique with regard to their breadth as well as their focus on potential impacts of mid-frequency active sonar (MFAS) and at-sea explosions on marine mammals and sea turtles. To accomplish these goals, the Navy will use similar methods of implementation and data analysis which have demonstrated success in comparable monitoring programs studying the effects of anthropogenic sound on marine animals. To this end, the Navy in consultation with NMFS designed a series of focused "study questions" to gather data in various combinations within the Navy's range complexes to address:

- Question 1. Are marine mammals and sea turtles exposed to mid-frequency active sonar (MFAS), especially at levels associated with adverse effects (i.e., based on NMFS' criteria for behavioral harassment, TTS, or PTS)? If so, at what levels are they exposed?

- Question 2. If marine mammals and sea turtles are exposed to MFAS in the TMAA, do they redistribute geographically as a result of continued exposure? If so, how long does the redistribution last?

- Question 3. If marine mammals and sea turtles are exposed to MFAS, what are their behavioral responses to various levels?

- Question 4. What are the behavioral responses of marine mammals and sea turtles that are exposed to explosives at specific levels?

- Question 5. Is the Navy's suite of mitigation measures for MFAS and explosives (e.g., Protective Measures Assessment Protocol [PMAP]), major exercise measures agreed to by the Navy through permitting) effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

Given the larger scope of training events within other Navy range complexes as compared to GOA, not every one of these original five study questions will be addressed within the TMAA. Rather, data collected from the GOA TMAA monitoring will be used to supplement a consolidated range complex marine mammal monitoring report incorporating data from the Atlantic Fleet Active Sonar Training Range, Hawaii Range Complex, Northwest Training Range Complex, Marianna Islands Range Complex, and Southern California (SOCAL) Range Complex.

Monitoring methods proposed for the TMAA include use of passive acoustic monitoring to primarily focus on providing additional data for study questions 2, 3, and 4. In addition, in April of 2009, the Navy contributed approximately $150,000 in funding to support a NMFS marine mammal density survey of the offshore waters in GOA. The goal of this validation monitoring was increase the state of awareness on marine mammal occurrence, density, and distribution within GOA, an area that has not had significant visual survey effort. In addition to the U.S. Pacific Fleet funded monitoring initiative, the Chief of Naval Operations (CNO) Environmental Readiness Division and the Office of Naval Research (ONR) have developed a coordinated Science & Technology and Research & Development program focused on marine mammals and sound. Total investment in this program from 2004-2008 was $100 million. FY09 funding was $22 million. Continued funding at levels greater than $14 million is foreseen in subsequent years (2010 and beyond).

This GOA TMAA Monitoring Plan has been designed to attempt gathering data on all species of marine mammals and sea turtles observed in the TMAA study area. However, the Navy will prioritize monitoring efforts for species based on regulatory requirement due to ESA-listing, and on non-ESA-listed beaked whales. Therefore, offshore species for study within the Monitoring Plan that regularly occur within TMAA will be prioritized for research as follows:

- Beaked whale species (Baird's beaked whale, Cuvier's beaked whale, Stejneger's beaked whale)
- ESA-listed cetacean species (blue whale, fin whale, humpback whale, North Pacific right whale, sei whale, and sperm whale)

As an adaptive management strategy, the GOA TMAA Monitoring Plan will integrate elements from Navy-wide marine mammal research into the regional monitoring and data analysis proposed in this Plan when new technologies and techniques become available. Specific areas within the TMAA will be selected after consultations with NMFS and the regional science community for the most appropriate monitoring technique. Each monitoring technique has advantages and disadvantages that vary temporally and spatially, as well as support one particular study objective better than another. Given potential sea states and ocean conditions during winter, and the relatively infrequent Navy presence in the GOA, passive acoustic monitoring represents the best current technique to employ within the TMAA. There may be a number of potential additional marine mammal monitoring techniques, or variations of those already described, that could be attempted under this Plan. Future modifications to the TMAA Monitoring Plan may include integration of additional marine mammal monitoring techniques and research as either new technology or new information becomes available. As part of future dialogue to begin in the summer of 2010 with NMFS marine mammal scientists, Alaska academic scientists, and other subject matter experts with extensive field monitoring experience, the Navy will continually solicit input and recommendations to this Plan. An annual formal review with NMFS is being proposed at the end of each year's monitoring to capture lessons learned, and seek concurrence as to the best mix of monitoring techniques to employ in the next year's sampling based on scientific merit, applicability to the direct research questions posed in this Plan, and logistic and economic feasibility.

#### 5.2.1.5 Stranding Response Plan for Major Navy Training Exercises in the TMAA

NMFS and the Navy will develop a draft Stranding Response Plan for Major Exercises in the TMAA. Pursuant to 50 CFR Section 216.105, the proposed plan outlined below will be included by reference and included in the TMAA proposed and final rules from NMFS, and included fully as part of (attached to) the Navy's MMPA LOA. This Stranding Response plan is specifically intended to outline the applicable requirements the authorization is conditioned upon in the event that a marine mammal stranding is reported in the TMAA during a major training exercise (MTE) (see glossary). As mentioned above, NMFS considers all plausible causes within the course of a stranding investigation. However, this plan in no way presumes that any strandings are related to, or caused by, Navy training activities, absent a

determination made in a Phase 2 Investigation as outlined in this plan, indicating that MFAS or explosive detonation in the TMAA were a cause of and/or contributed to the stranding. This plan is designed to address the following three issues:

- Mitigation – When marine mammals are in a situation that can be defined as a stranding (see glossary below), they are experiencing physiological stress. When animals are stranded, and alive, NMFS believes that exposing these compromised animals to additional known stressors would likely exacerbate the animal's distress and could potentially cause its death. Regardless of the factor(s) that may have initially contributed to the stranding, it is NMFS' goal to avoid exposing these animals to further stressors. Therefore, when live stranded cetaceans are in the water and engaged in what is classified as an Uncommon Stranding Event (USE) (see Appendix F), the shutdown component of this plan is intended to minimize the exposure of those animals to MFAS and explosive detonations, regardless of whether or not these activities may have initially played a role in the event.
- Monitoring – This plan will enhance the understanding of how MFAS (as well as other environmental conditions) may, or may not, be associated with marine mammal injury or strandings. Additionally, information gained from the investigations associated with this plan may be used in the adaptive management of mitigation or monitoring measures in subsequent LOAs, if appropriate. We note that detections of stranded marine mammals off the southern Alaskan Coast are typically accomplished using passive surveillance, i.e. individuals conducting their normal activities happen to see an animal and report it to the stranding network. If surveys or expanded active detection efforts are specifically used during Navy training exercises, we expect that the number of strandings detected during training may be higher relative to other times because of the increased targeted effort.
- Compliance – The information gathered pursuant to this protocol will inform NMFS' decisions regarding compliance with Sections 101(a) (5) (B and C) of the MMPA. In addition to outlining the necessary procedural steps for the Navy to undertake in the event of a USE during an MTE (as required by the LOA), this document describes NMFS' planned participation in stranding responses off the Alaskan Coast, as NMFS' response relates specifically to the Navy requirements described here. The NMFS Marine Mammal Health and Stranding Response Program (MMHSRP) and the participating Regional Stranding Networks have specific responsibilities regarding unusual marine mammal mortality events (UMEs) pursuant to Title IV of the MMPA. This standing plan does not serve to replace or preclude any of the procedures currently in place for NMFS' response to UMEs or to any normal operations of the stranding network. NMFS will pursue any activities to fulfill obligations relative to UMEs any time that a trigger is reached as determined by the Working Group on Marine Mammal Unusual Mortality Events. This document highlights (or adds to) applicable existing (and in development) protocols and procedures to be used with the specific circumstances and specific subset of strandings addressed here, namely a USE off the Alaskan Coast during the MTE. This document has been reviewed and approved by the NMFS staff responsible for conducting and overseeing the referenced activities and this plan will be implemented by NMFS to the degree that resources are available and logistics are feasible.

**General Notification Provision**

If, at any time or place (i.e., not just in TMAA and not just during the activities covered under NMFS' regulations), Navy personnel find a stranded marine mammal either on the shore, nearshore, or floating at sea, NMFS requests the Navy contact NMFS immediately (or as soon as clearance procedures allow) as described in the TMAA Stranding Communication Protocol (currently under development, but subject to incorporation into this plan upon mutual agency approval). NMFS will request the Navy provide NMFS with species or description of animal(s), the condition of the animal (including carcass condition if the

animal is dead, location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In addition, NMFS requests that in the event of a ship strike by any Navy vessel, at any time or place, the Navy do the following:

- Navy 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).
- As soon as feasible, report to NMFS the size and length of animal, an estimate of the injury status (e.g., dead, injured but alive, injured and moving, unknown, etc.), vessel class/type, and operational status.
- Report to NMFS the vessel length, speed, and heading as soon as feasible.
- Provide NMFS a photo or video, if possible.

**Operational Response Plan**

This section describes the specific actions the Navy must take in order to comply with NMFS' GOA TMAA LOA if a USE is reported to the Navy off the southern Alaskan Coast coincident to, or within 72 hours of, an MTE. This Stranding Response Plan will include an associated TMAA Stranding Communication Protocol (currently under development, but subject to incorporation into the Stranding Plan upon mutual agency approval), which will indicate, among other things, the specific individuals (NMFS Office of Protected Resources - HQ senior administrators) authorized to advise the Navy that certain actions are prescribed by the Stranding Response Plan.

1. Initial Stranding Response – The NMFS regional stranding network will respond to reports of stranded marine mammals in areas where there is geographic coverage by the stranding network, when feasible. All cetaceans that are responded to will receive examination appropriate to the condition code of the animal and the feasibility of the logistics. If a qualified individual determines that the stranding is a USE, NMFS staff (or other qualified individual) will initiate a Phase 1 Investigation. NMFS will immediately contact appropriate NMFS and Navy personnel (pursuant to the TMAA Stranding Communication Protocol). NMFS and Navy will maintain a dialogue, as needed, regarding the identification of the USE and the potential need to implement shutdown procedures.

2. Shutdown Procedures – Shutdown procedures are not related to the investigation of the cause of the stranding and their implementation is in no way intended to imply that MFAS is the cause of the stranding. Rather, as noted above, shutdown procedures are intended to protect cetaceans exhibiting indicators of distress and involved in a USE by minimizing their exposure to possible additional stressors (MFAS or explosive detonations), regardless of the factors that initially contributed to the USE. Only individuals specifically identified in the TMAA Stranding Communication Protocol (NMFS Protected Resources – HQ senior administrators) will be authorized to advise the Navy of the need to implement shutdown procedures (pursuant to the Stranding Response Plan/LOA).

a) If live or freshly dead cetaceans are involved in the USE, the Navy will implement the following procedures:

- If live cetaceans involved in the USE are in the water (i.e., could be exposed to sonar), NMFS will advise the Navy of the need to implement shutdown procedures defined in the glossary (pursuant to the Stranding Response Plan/LOA).
- NMFS will coordinate internally, with the Navy, and with other agencies and entities with the intent of obtaining aerial survey arrangements. If an aircraft is available, a survey will be

conducted within 14 miles (on the shore and in the water near the coast) of the stranding to look for additional animals that meet the USE criteria. NMFS will request that the Navy assist with aerial surveys, as resources are available.

- If no additional animals that meet the USE criteria are found (including if no aircraft were available to conduct a survey), and the originally detected animals are not in the water, and will not be put back in the water for rehabilitation or release purposes, or are dead, NMFS will advise the Navy that shutdown procedures need not be implemented at any additional locations.
- If additional cetacean(s) meeting the USE criteria are detected by surveys, the shutdown procedures will be followed for the newly detected animal(s) beginning at 2(a) above.
- If a qualified individual determines that it is appropriate to put live animals that were initially on the beach back in the water for rehabilitation or release purposes, NMFS will advise the Navy of the need to implement shutdown procedures pursuant to the Stranding Response Plan/LOA.

b) If the Navy finds an injured (or entangled) or dead cetacean floating at sea during an MTE, the Navy shall notify NMFS (pursuant to TMAA Stranding Communication Protocol) immediately or as soon as operational security considerations allow. The Navy should provide NMFS with the information outlined in the general notification provision above, as available. Based on the information provided, NMFS will determine if a modified shutdown (i.e., a shutdown other than those described here, based on specific information available at the time) is appropriate on a case-by-case basis.

c) In the event, following a USE, that: a) qualified individuals are attempting to herd animals back out to the open ocean and animals are not willing to leave, or b) animals are seen repeatedly heading for the open ocean but turning back to shore, NMFS and the Navy will coordinate (including an investigation of other potential anthropogenic stressors in the area) to determine if the proximity of MFAS operations or explosive detonations, though farther than 14 nm from the distressed animal(s), is likely decreasing the likelihood that the animals return to the open water. If so, NMFS and the Navy will further coordinate to determine what measures are necessary to further minimize that likelihood and implement those measures as appropriate. Navy and NMFS will maintain a dialogue regarding the plan to return the animal(s) to the water.

d) If no live (Condition Code 1) or freshly dead (Condition Code 2) cetaceans are involved in the USE, NMFS will advise the Navy that shutdown procedures need not be implemented. Aerial surveys will be conducted if feasible (see second bullet below).

3. Restart Procedures

- If at any time, the subject(s) of the USE die or are euthanized, NMFS will immediately advise the Navy that the shutdown around that animal(s)' location is no longer needed.
- Shutdown procedures will remain in effect until NMFS determines that, and advises the Navy that, all live animals involved in the USE have left the area (either of their own volition or herded). Leading up to restart, NMFS will coordinate internally, with the Navy, and with other federal and state agencies with the intent of securing arrangements to track the movement of the animals (via aircraft, vessel, tags, etc.) following the dispersal of the USE. If the Navy has restarted operations in the vicinity of the animals, NMFS and the Navy will further coordinate to determine (based on location and behavior of tracked animals and location/nature of Navy activities) if the proximity of MFAS operations is likely increasing the likelihood that the animals re-strand. If so, NMFS and the Navy will further coordinate to determine what measures are necessary to minimize that likelihood and implement those measures as appropriate.

4. Information – Within 72 hours of the notification of the USE the Navy will inform NMFS where and when they were operating MFAS or conducting explosive detonations (within 80 nm and 72 hours prior to the event). Within 7 days of the completion of any exercises that were being conducted within 80 nm or 72 hours prior to the event, the Navy will further provide available information to NMFS (per the GOA Stranding Communication Protocol) regarding the number and types of acoustic/explosive sources, direction and speed of units using MFAS, and marine mammal sightings information associated with those training activities. Information not initially available regarding the 80 nm, 72 hours, period prior to the event will be provided as soon as it becomes available. The Navy will provide NMFS investigative teams with additional relevant unclassified information as requested (or classified information to designated NMFS staff), if available.

5. Phase 1 Investigation – Because of the variability of available resources across stranding network agencies in the Alaska region, NMFS cannot currently commit, in advance, to the specific degree of investigation that will be conducted for any given stranding. NMFS stranding coordinators are currently assessing available resources with the goal of setting forth a plan that realistically outlines the possible responses in a given area. Meanwhile, the ideal responses (Phase 1 and 2 Investigations) are described in the Biomonitoring Protocols and are referred to below (here and in # 7), and NMFS will respond in the indicated manner when resources are available and it is logistically feasible:

Within 4 weeks of a USE (when feasible), NMFS will conduct and complete the Phase 1 Investigation (list of procedures typically included in Phase 1 investigation are included in the glossary of this document, description of actual procedures are contained in the Biomonitoring Protocols) for all USEs that occur along the southern Alaskan Coast coincident with MTEs. Results from the Phase 1 Investigation will be categorized in one of the two ways discussed below and trigger the indicated action:

- If the results of the Phase 1 Investigation indicate that the USE was likely caused by something (such as entanglement or ship strike) other than MFAS or explosive detonations authorized by the Navy's LOA, then the USE investigation will be considered complete as related to the MMPA authorization.
- If NMFS cannot conclude that the stranding was likely caused by something other than MFAS or explosive detonations authorized by the Navy LOA, rather, the results of the Phase 1 Investigation range from completely inconclusive to including potential early indicators that acoustic exposure could have played a role, then a Phase 2 Investigation will be conducted by qualified individuals, under the direction of NMFS staff, and an individual case report will be prepared for each animal (list of procedures typically included in Phase 2 investigation are included in the Glossary of this document, description of actual procedures are contained in the Biomonitoring Protocols).

6. Memorandum of Agreement (MOA) – The Navy and NMFS will develop an MOA, or other mechanism consistent with federal fiscal law requirements (and all other applicable laws), that allows the Navy to assist NMFS with the Phase 1 and 2 Investigations of USEs through the provision of in-kind services, such as (but not limited to) the use of plane/boat/truck for transport of stranding responders or animals, use of Navy property for necropsies or burial, or assistance with aerial surveys to discern the extent of a USE. The Navy may assist NMFS with the Investigations by providing one or more of the in-kind services outlined in the MOA, when available and logistically feasible and which do not negatively affect Fleet operational commitments.

7. Phase 2 Investigation – Please see # 5, Phase 1 Investigation. Results from the Phase 2 Investigation (procedures outlined in the Biomonitoring Protocols) will be categorized in one of the three ways discussed below and trigger the indicated action:

- If the results indicate that the USE was likely caused by something (such as entanglement or blunt force trauma) other than MFAS or explosive detonations authorized by the Navy's LOA, then the USE investigation will be considered complete as related to the MMPA authorization.
- If the results are inconclusive which, historically, is the most likely result (i.e., NMFS can neither conclude that the USE was likely caused by something other than acoustic trauma nor conclude that there is a high likelihood that exposure to MFAS or explosive detonations were a cause of the USE), then the USE investigation will be considered complete as related to the MMPA authorization.
- If the results of a comprehensive and detailed scientific investigation into all possible causes of the stranding event indicate that there is a high likelihood that MFAS was a cause of the USE, one of the following will occur: The Navy will be provided at least ten working days to review and provide comments on NMFS' summary and characterization of the factors involved in the USE. NMFS will consider the Navy's comments prior to finalizing any conclusions and/or deciding to take any action involving any take authorization.

8. USE Response Debrief and Evaluation – Within 2 months after a USE, NMFS and Navy staff will meet to discuss the implementation of the USE response and recommend modifications or clarifications to improve the Stranding Response Plan. These recommendations will feed into the adaptive management strategy discussed below.

9. Adaptive Management – The regulations under which the Navy's LOA (and this Stranding Response Plan) are issued will contain an adaptive management component. This gives NMFS the ability to consider the results of the previous years' monitoring, research, and/or the results of stranding investigations when prescribing mitigation or monitoring requirements in subsequent years. In the event that NMFS concludes that there is a high likelihood that MFAS or explosive detonations were a cause of a USE, NMFS will review the analysis of the environmental and operational circumstances surrounding the USE. In subsequent NMFS LOAs, based on this review and through the adaptive management component of the regulations, NMFS may require the mitigation measures or Stranding Response Plan be modified or supplemented if the new data suggest that modifications would either have a reasonable likelihood of reducing the chance of future USEs resulting from a similar confluence of events or would increase the effectiveness of the stranding investigations. Further based on this review and the adaptive management component of the regulations, NMFS may modify or add to the existing monitoring requirements if the data suggest that the addition of a particular measure would likely fill a specifically important data or management gap. Additionally, the USE Debrief and Evaluation discussed above (in combination with adaptive management) will allow NMFS and the Navy to further refine the Stranding Response Plan for maximum effectiveness.

### Communication

Effective communication is critical to the successful implementation of this Stranding Response Plan. Very specific protocols for communication, including identification of the Navy personnel authorized to implement a shutdown and the NMFS personnel authorized to advise the Navy of the need to implement shutdown procedures (NMFS Protected Resources HQ – senior administrators) and the associated phone trees, etc. (to be included in the document entitled "TMAA Stranding Communication Protocols") will be finalized at a subsequent date, and updated yearly (or more frequently, as appropriate).

The Stranding Response Plan is dependent upon advance notice to NMFS (HQ and Alaska Regional Office) of the planned upcoming MTE. NMFS and the Navy will develop a mechanism (that conforms with operational security requirements) wherein the Navy can provide NMFS with necessary advance notification of MTEs.

NMFS will keep information about planned MTEs in a confidential manner and will transmit information to NMFS personnel responding to USEs to the minimum necessary to accomplish the NMFS mission under this plan.

**Supplemental Documents in Development**

*GOA Stranding Communication Protocol*

This document, which is currently in development, will include all of the communication protocols (phone trees, etc.) and associated contact information required for NMFS and the Navy to carry out the actions outlined in this Stranding Response Plan. This document is currently being developed by NMFS and when completed, will be updated yearly (or more frequently, as appropriate).

*Biomonitoring Protocols for GOA*

This NMFS document (which is currently in a draft form, but will be finalized in 2010) will contain protocols for the procedures that are necessary for NMFS staff to implement this Stranding Plan including:

- Qualifications necessary for individuals to implement certain parts of the Stranding Plan, such as: identifying a USE, identifying a Code 2 animal, or conducting a Phase 1 or 2 Investigation
- A protocol for the stranding responders that outlines the actions to take in the event of a USE during MTEs
- Protocols for the investigators that describe in detail the procedures implemented for conducting the Phase 1 and Phase 2 Investigations

*Memorandum of Agreement*

This document (or other mechanism consistent with federal fiscal law requirements and all other applicable laws), which will be finalized in 2010, will establish whereby the Navy can assist with stranding investigations, when feasible. This document will include a comprehensive list of the specific ways the Navy could provide this assistance.

#### 5.2.1.6 Alternative Mitigation Measures Considered but Eliminated

As described in Section 3.9 and Appendix D, the vast majority of estimated sound exposures of marine mammals in the GOA during proposed active sonar activities would not cause injury. Potential acoustic effects on marine mammals would be reduced by the mitigation measures described previously. Therefore, through this EIS/OEIS and associated regulatory documents, NMFS and the Navy have concluded the Proposed Action and mitigation measures would achieve the least practical adverse impact on species or stocks of marine mammals.

In making a determination of "least practicable adverse impact" for MMPA analysis, NMFS considers the following factors relative to one another: (1) the manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for Navy implementation, which includes consideration of personnel safety, practicality of implementation, and the impact on the effectiveness of the military readiness activity. Given these considerations, the following additional mitigation measures were analyzed and through the following explanation are eliminated from further consideration.

***Seasonal and/or Geographic Limitations:***

*Benefit to Marine Mammals/Effectiveness of Measure*

In previous documents NMFS has indicated that seasonal or geographic limitations are a direct and effective means of reducing adverse impacts to marine mammals. By reducing the overlap in time and space of the known concentrations of marine mammals and the acoustic footprint associated with the thresholds for the different types of take (either at all times and places where animals are concentrated, or times and places where they are concentrated for specifically important behaviors [such as reproduction or feeding]), the amount of take can be reduced.

However, the concept of geographical and seasonal (or temporal) limitations is inconsistent with the Title 10 responsibilities of Department of Defense to assure a fully trained and ready military force in regards to training activities in the GOA. Such restrictions would not be appropriate in the GOA. The training area locations utilized in the GOA were very carefully chosen by planners based on training requirements and the ability of ships, aircraft, and submarines to operate safely. Moving the training activities to alternative locations would impact the effectiveness of the training and has no known benefit.

It is important that any measures are used carefully at times and places where their effects are relatively well known. For example, if there is credible evidence that concentrations of marine mammals are known to be high at a specific place or during a specific time of the year, or that certain areas are selectively used for important life functions like breeding or feeding (such as the high densities of humpback whales in the main Hawaiian Islands, or North Atlantic right whale critical habitat on the east coast), then these types of seasonal or geographic exclusions or limitations can be effective. However, if marine mammals are only known to prefer certain types of areas (as opposed to specific areas) for certain functions (such as beaked whales use of seamounts or marine mammal use of productive areas like fronts), which means that they may or may not be present at any specific time, it may be less effective to require avoidance or limited use of that type of area all of the time.

*Practicability of the Measure*

Generally speaking, and specifically discussed in Chapter 2 of the EIS/OEIS, the Navy needs to have the flexibility to operate at any time or place to meet their training needs pursuant to Title 10. The Navy needs to be able to train in the largest variety of physical (bathymetry, etc.), environmental, and operational (within vicinity of different assets, such as airfields, instrumented ranges, homeports, etc.) parameters in order to be properly prepared. Additionally, Navy training, planning and implementation needs to be adaptable in order to accommodate the need of the Navy to respond to world events and the ever-changing strategic focus of the U.S. The Navy has always expressed a need to maintain the flexibility to train in an area if necessary for national security, and any measures imposed by NMFS need to account for this reality.

Aside from the general reasons of impracticability cited above, below are some of the specific reasons that certain specific types of seasonal and geographic restrictions or limitations are impracticable for the Navy.

Coastal restrictions (such as 25 nm from 200-m isobath) - Littoral waterspace is where potential enemies will operate. The littoral waterspace is also the most challenging area to operate due to a diverse acoustic environment. In real world situations, it is highly likely the Navy would be working in these types of areas. It is not realistic to refrain from training in the areas that are the most challenging and operationally important. Areas where ASW events are scheduled to occur are carefully chosen to provide for the safety of events and to allow for the realistic development of the training scenario including the ability of the exercise participants to develop, maintain, and demonstrate proficiency in all areas of warfare simultaneously. Limiting the training event to a few areas would have an adverse impact on the effectiveness of the training by limiting the ability to conduct other critical warfare areas including, but not limited to, the ability of the Strike Group to defend itself from threats on the surface and in the air while carrying out air strikes and/or amphibious assaults. In those locations where amphibious landing

events occur, coastal restrictions would decouple ASW training and Amphibious training, which are critically important to be conducted together due to the high risk to forces during actual Amphibious operations. Furthermore, training activities using integrated warfare components require large areas of the littorals and open ocean for realistic and safe training.

Sea Mounts and Canyons - Submarine tracking is a long and complicated tactical procedure. Seamounts are often used by submarines to hide or mask their presence, requiring the need to train in this complex ocean environment. This is precisely the type of area needed by the Navy to train. Sea mounts and canyons impact the way sound travels in water as well as the Navy's ability to search and track submarines. If the Navy does not train near sea mounts and canyons and understand how these features affect their ability to search and track a submarine, they will be unable to do so when faced with an actual threat. Exercise locations are carefully chosen based on training requirements and the ability of ships, aircraft, and submarines to operate safely. Given the strategic training needs, restricting active sonar operation around seamounts and canyons in the TMAA is not practicable. This discussion considers the impracticability of avoiding all seamounts and canyons. While it may be somewhat less impracticable to avoid a subset of specific seamounts or canyons, marine mammal use of these areas is ephemeral and varies based on many changing factors, which would make it difficult to justify requiring the avoidance of any particular features since doing so may or may not benefit marine mammals at any particular time.

Fronts and other Major Oceanographic Features – NMFS has determined that the impracticability to the Navy of avoiding these features outweighs the potential conservation gain. Though many species may congregate near fronts and other major oceanographic features, these areas may be both large and transitory, so restricting access to these features to avoid animals that may congregate in a small subset of the total areas is not practicable. Additionally, limiting sonar use in the vicinity of these types of features would disrupt training for the reasons described above for sea mounts and canyons.

#### *Use of Dedicated or Independent Marine Mammal Observers (MMOs) to Implement Mitigation:*

*Benefit to Marine Mammals/Effectiveness of Measure*

Navy lookouts are specifically trained to detect anything (living or inanimate) that is in the vicinity of, visible from, or approaching the vessel. The safety of the personnel on board and of the vessel depends on their performance. While they receive training that is intended to expose them to the different species of marine mammals they might see and the behaviors they might potentially observe, they would certainly not be expected to differentiate between species or identify the significance of a behavior as effectively as an independent MMO. However, identification to species and understanding of marine mammal behavior is not necessary for mitigation implementation – for that, a lookout must simply detect a marine mammal and estimate its distance (e.g., within 1000 yds, 500 yds, or 200 yds) to the vessel. Though dedicated and independent MMOs are critical to implement a Monitoring Plan, Navy lookouts performing their normal duties are expected to be effective at detecting marine mammals for mitigation implementation.

*Practicability of the Measure*

Following are several reasons for why using third-party observers from air or surface platforms, in addition to or instead of the existing Navy-trained lookouts is not practicable.

- The use of third-party observers could compromise security due to the requirement to provide advance notification of specific times/locations of Navy platforms.
- Reliance on the availability of third-party personnel would also impact training flexibility, thus adversely affecting training effectiveness. The presence of other aircraft in the vicinity of naval exercises would raise safety concerns for both the commercial observers and naval aircraft.
- Use of Navy observers is the most effective means to ensure quick and effective implementation of mitigation measures if marine species are spotted. A critical skill set of effective Navy training

is communication. Navy lookouts are trained to act swiftly and decisively to ensure that appropriate actions are taken.

- Security clearance issues would have to be overcome to allow non-Navy observers onboard exercise platforms.
- Some training events will span one or more 24-hour period(s), with operations underway continuously in that timeframe. It is not feasible to maintain non-Navy surveillance of these operations, given the number of non-Navy observers that would be required onboard.
- Surface ships with active mid-frequency sonar have limited berthing capacity. Exercise planning includes careful consideration of this limited capacity in the placement of exercise controllers, data collection personnel, and Afloat Training Group personnel on ships involved in the exercise. Inclusion of non-Navy observers onboard these ships would require that in some cases there would be no additional berthing space for essential Navy personnel required to fully evaluate and efficiently use the training opportunity to accomplish the exercise objectives.
- Aerial surveying during an event raises safety issues with multiple, slow civilian aircraft operating in the same airspace as military aircraft engaged in combat training activities. In addition, most of the training events take place far from land, limiting both the time available for civilian aircraft to be in the exercise area and presenting a concern should aircraft mechanical problems arise.
- Scheduling civilian vessels or aircraft to coincide with training events would impact training effectiveness, since exercise event timetables cannot be precisely fixed and are instead based on the free-flow development of tactical situations. Waiting for civilian aircraft or vessels to complete surveys, refuel, or be on station would slow the progress of the exercise and impact the effectiveness of the military readiness activity.
- Multiple events may occur simultaneously in areas at opposite ends of the TMAA and continue for multiple days at a time. There are not enough qualified third-party personnel to accomplish the monitoring task.

#### *Use of Additional Detection Methods to Implement Mitigation (Shutdown Zones):*

*Benefit to Marine Mammals/Effectiveness of Measure*

Lookouts stationed on surface vessels are currently the primary component of the Navy's marine mammal detection capabilities, with some opportunistic assistance from aerial or passive acoustic platforms when such assets are participating in a given exercise. The use of additional detection methods, such as those listed in Section 5.2.1.2, for the implementation of mitigation might further minimize the Level A and Level B of marine mammals. Specifically, passive and active acoustic methods may detect animals that were below the surface (for passive acoustic detection, the animals would have to be vocalizing to be detected, but for active acoustic detection they would not – the HFM3 system utilized by LFA sonar vessels effectively detects marine mammals to within 1 km of the sonar source).

In order for additional marine mammal detection methods to assist in the implementation of mitigation (shutdown and powerdown), they must be able to localize, or identify where the marine mammal is in relation to the sound source of concern (since shutdown and powerdown mitigation is triggered by the distance from the sound source), and transmit the applicable data to the commanding officer in real time (i.e., quickly so that the sonar source can be turned down or shut off right away or the explosive detonation can be delayed). A limited number of techniques based on the real-time participation of additional observers (such as additional aerial platforms) can achieve this, while many passive acoustic methods cannot. The section below contains information that speaks both to the practicality of implementation of some methods as well as the effectiveness.

*Practicability of the Measure*

Radars - While Navy radars are used to detect objects at or near the water surface, radars are not specifically designed to search for and identify marine mammals. For example, when an object is detected by radar, the operators cannot definitively discern that it is a whale. During a demonstration project at Pacific Missile Range Facility (PMRF) in Hawaii, radar systems were only capable of detecting whales under very controlled circumstances and when these whales were already visually spotted by lookouts/watchstanders. Enhancing radar systems to detect marine mammals requires additional resources to schedule, plan and execute Navy limited objective experiments (LOEs) and RDT&E events. The Navy is currently reviewing opportunities to pursue enhancing radar systems and other developmental methods such as laser detection and ranging technology as potential mitigation for detecting marine mammals. Until funding resources and the data are available to develop enhanced systems, it is not known whether it will be technically feasible in the future to implement radar as an additional detection method.

Additional Platforms (aerial, UAV, Gliders, and Other) - The number of aerial and unmanned aerial vehicle (UAV) systems currently integrated into fleet training is extremely low and their availability for use in most training events is rare; therefore, shifting their use and focus from hunting submarines to locating marine mammals would be costly and negatively impact the training objectives related to these systems. If additional platforms are civilian, scheduling civilian vessels or aircraft to coincide with training events would affect training effectiveness since exercise events or timetables are not fixed and are based on a free flow development of tactical situations. Waiting for civilian aircraft or vessels to complete surveys, refuel, or be on station would slow the required progress of the training exercise. In addition, the precise location data and exercise plans provided to non-Navy assets poses logistical challenges and classification or security issues. While the Navy is currently reviewing options for additional detection methods, these additional platforms proved to be impracticable for the following reasons:

- Additional Aerial Survey Detection: Airborne assets when available already monitor for the presence of marine mammals with no reported incidents where marine mammals were overlooked during an exercise or where aerial assets were unable to perform their duties while watching for marine mammals; therefore, the allocation of additional airborne assets is not well justified. In addition, the presence of additional aircraft (not involved in the exercise) near naval exercises would present safety concerns for both commercial and naval observers because ASW training exercises are dynamic, can last several hours or days, and cover large areas of ocean several miles from land.
- UAV Detection: Currently and in the foreseeable five-year period of the requested authorization, these assets are extremely limited and are rarely if ever available and, therefore, impractical and expensive.
- Gliders Detection: Gliders are not currently capable of providing real time data and, therefore, are not an effective detection method for use in mitigation implementation.

Active Sonar - As previously noted, the Navy is actively engaged in acoustic monitoring research involving a variety of methodologies; however, none of the methodologies have been developed to the point where they could be used as a mitigation tool for MFAS or HFAS. At this time, the active sonar and adjunct systems listed below proved to be impracticable for the following reasons:

- Use of multiple systems (meaning the MFAS used for the exercise plus any additional active system used for marine mammal detection) operating simultaneously increases the likelihood that a submarine may be detected under conditions where it is attempting to mask its presence before activating sonar, resulting in an impact to the effectiveness of the military readiness activity. Additionally, interference may occur when certain active sonar systems (such as HFM3) are activated concurrently with MFAS.

- HFM3 is an adjunct system used by LFA because the hulls of those platforms can be modified and travel can occur at slow speeds. MFAS combatants are not equipped with HFM3 systems and it is impractical to install such a system on MFAS combatants.

The Navy will continue to coordinate acoustic monitoring and detection research specific to the proposed use of active sonar. As technology and methodologies become available, their applicability and viability will be evaluated for potential future incorporation.

Additional Passive Acoustic Monitoring - To provide a specialized localization capability (distance, direction, etc.), most of the systems (Sonobuoys, SQQ89, Bottom-Mounted Sensors) would require significant modifications. The Navy is working to develop or enhance systems with distance measuring capabilities. Until these capabilities are available, exercise participants can use these systems to aid in marine mammal detection, but not solely to implement mitigation measures. Although passive contact on marine mammals only indicates the presence, not the range (distance and direction), the information on any passive acoustic detections is disseminated real time to allow lookouts to focus their visual search for marine mammals.

The Navy is improving the capabilities to use range instrumentation to aid in the passive acoustic detection of marine mammals. At the Southern California Offshore ASW Range (SOAR) in the SOCAL Range Complex, development of effective passive acoustic detection as part of the instrumented range is progressing fairly rapidly. Passive acoustic monitoring has the potential to significantly improve the ability to detect marine mammal presence within SOAR. The Navy sponsored Marine Mammal Monitoring on Navy Ranges (M3R) program has developed hardware and software that leverages the SOAR sensors to detect and localize marine mammal vocalizations. Localization is possible when the same signal is detected, precisely time-tagged, and associated on at least three sensors. Prototype M3R systems have been installed on both the AUTEC (Bahamas) and SOAR ranges.

The M3R system is capable of monitoring all the range hydrophones in real-time. The Navy is refining the M3R system by developing tools to display detected transient signals including marine mammal vocalizations and localizations. The tools operate in real-time and are being used in a series of tests to document marine mammal species, their vocalizations, and their distribution on the SOAR range. In addition, they are being used to collect and analyze opportunistic data at AUTEC, and as part of the on-going Behavioral Response Study (BRS) there.

Reliable automated methods are needed for detection and classification of marine mammal calls to allow range hydrophones to be used for routine marine mammal monitoring in SOAR. The performance of these hydrophones must be quantified. The calls of many baleen whale species are stereotyped and well known. Identification of stereotyped mysticete calls within SOAR has been accomplished using automatic detectors. However, the full range of mysticete call types that are expected within SOAR is not known (e.g. sei whales). Odontocete call identification is more difficult owing to their call complexity. Calls of some odontocetes, such as sperm whales, killer whales, and porpoises, are easily distinguishable. For most species, however, the variation in and among call types is a topic of current research. Likewise, pinniped call types are complex and more data are needed to develop automatic detectors and classifiers to allow automated identification for pinniped species within SOAR. The Navy continues to develop this technology.

At SOAR the large number of species and high animal density combined with imprecise acoustic localization makes the efficacy of such monitoring for use for mitigation implementation during real-time operations questionable.

Prior to implementation of real-time passive acoustic monitoring for use in mitigation, the species present and their distribution should be established. A system must be implemented on range and Detection, Classification, and Localization (DCL) algorithms specific to these species must be developed and tests with visual observers must be conducted to verify their performance. The Navy continues to work on this, and such systems are not yet available for consideration as required mitigation.

Infrared technology – As a complement to existing methods, use of the Infrared (IR) band for marine mammal detection and location has some obvious benefits if proved viable, including the ability to operate infrared at night, as well as the ability to establish automated detections procedures which might well reduce the factor of human fatigue that affects observer-based methods. The Navy has committed to a program of research, development, and testing of IR-based technologies for detection of marine mammals in the wild.

The Navy program will have two main thrusts. NAVAIR will continue to pursue operational tests of their airborne monitoring and mitigation program for marine species using net-centric Intelligence, Surveillance, and Reconnaissance (ISR) systems. The proposed system uses a radar detect and track cueing sensor for a turreted airborne Electro-Optic/Infrared/Multi-spectral imaging sensor. If fully funded for prototyping and demonstration, this program would evaluate the efficacy for marine mammal detection of a large, high-powered system designed, tested, and deployed for other purposes, and operates beyond the domain of research Science and Technology.

At the same time, the Office of Naval Research (ONR) will take the lead in pursuing a longer-range, research S&T program to evaluate new concepts for IR detection that may ultimately lead to an operationally viable technique(s). The focus of the ONR effort will be on comparatively small, low-power systems that might be deployable on small, robot aircraft known as Unmanned Aerial Vehicles (UAVs) as well as operating in a ship-based mode. Either option might allow the inclusion of standard video for confirmation of mammal detections during the day. The UAV option might allow for multiple passages of an area of interest at low altitude to confirm mammal detections and identification.

ONR will continue to support this effort for at least several years, with the potential for sustained support, though the future breadth of this program will depend on the outcome of early efforts. The system is not considered practicable to require for implementation at this time.

#### *Avoidance of Federal and State Marine Protected Areas:*

*Benefit to Marine Mammals/Effectiveness of Measure*

Pursuant to the MMPA, NMFS makes decisions regarding required mitigation based on biological information pertaining to the potential impacts of an activity on marine mammals and their habitat (and the practicability of the measure), not management designations intended for the broad protection of various other marine resources.

As mentioned previously, no known areas of specific importance to marine mammals (that would benefit from a training restriction, i.e., not counting pinniped haulouts where the animals are not in the water the majority of the time) are present within these designated areas. Therefore, limiting activity in these areas would be of questionable value to marine mammals.

*Practicability of the Measure*

As discussed above, these measures would not offer any additional benefit to marine mammals. Additionally, the impracticability of seasonal and geographic restrictions and limitations, which applies to this measure, is discussed above.

***Suspension of MFAS Training at Night, or During Low Visibility or Surface Duct:***

*Benefit to Marine Mammals/Effectiveness of Measure*

The Navy is capable of ***effectively monitoring*** a 1000-yd safety zone using night vision goggles and passive acoustic monitoring (infrared cameras are sometimes used as an extra tool for detection, when available, but have not been shown to show a significant enhancement of current capabilities). Night vision goggles are always available to all vessel and aircrews as needed and passive acoustic monitoring is always in use. As mentioned previously, the estimated zone in which TTS may be incurred is within about 140 m of the sound source (830 m for harbor seals), and the estimated zone for injury is within 10 m of the sonar dome. The powerdown and shutdown zones are at 1000, 500, and 200 yds. The Navy is expected to be able to effectively implement the necessary mitigation measures during nighttime and times of lower visibility.

Because of the limited visibility beyond 1000 yards, Navy personnel could potentially detect fewer animals early (outside of the 1000 yds), as they are approaching to within 1000 yd, which could result in a slightly delayed powerdown or shutdown as compared to when operations are conducted in full daylight. However, any such potential delays would be at the outer edge of the safety zone and would not result in an animal being exposed to received sound levels associated with TTS or injury. So, suspension of MFAS during times of lower visibility may slightly reduce the exposures of marine mammals to levels associated with behavioral harassment, but would not reduce the number of marine mammals exposed to sound levels associated with TTS or injury.

Regarding surface ducts, their presence is based on water conditions in the exercise areas, is not uniform, and can change over a period of a few hours as the effects of environmental conditions such as wind, sunlight, cloud cover, and tide changes alter surface duct conditions. Across a typical exercise area, the determination of "significant surface ducting" is continually changing, and this mitigation measures cannot be accurately implemented. Furthermore, surface ducting alone does not necessarily increase the risk of MFA sonar impacts to marine mammals. While surface ducting causes sound to travel farther before losing intensity, simple spherical and cylindrical spreading losses result in a received level of no more than 175 dB rms at approximately 1,100 yards (assuming the nominal source of 235 dB rms), even in significant surface ducting conditions.

*Practicability of the Measure*

ASW training using MFAS is required year round in all environments, to include nighttime and low visibility conditions or conditions that realistically portray bathymetric features where adversary submarine threats (i.e., extremely quite diesel electric or nuclear powered) can hide and present significant detection challenges. Unlike an aerial dogfight, which is over in minutes or even seconds, ASW is a cat and mouse game that requires large teams of personnel working in shifts around the clock (24-hours) typically over multiple days to complete an ASW scenario. ASW can take a significant amount of time to develop the tactical picture (i.e., understanding of the battle space such as area searched or unsearched, identifying false contacts, and water conditions). Reducing or securing power at night or in low visibility conditions would affect a Commander's ability to develop the tactical picture as well as not provide the needed training realism. If there is an artificial break in the exercise by reducing power or suspending MFAS use, the flow of the exercise is lost and several hours of training will have been wasted. Both lost time and training differently than what would be needed in combat diminish training effectiveness.

MFAS training at night is vital because differences between daytime and nighttime affect the detection capabilities of MFAS systems. Ambient noise levels are higher at night because many species use the nighttime period for foraging and movement. Temperature layers, which affect sound propagation, move up and down in the water column from day to night. Consequently, personnel must train during all hours

of the day to ensure they identify and respond to changing environmental conditions. An ASW team trained solely during the day cannot be sent on deployment and be expected to fight at night because they would not identify and respond to the changing conditions.

Finally, as a matter of safety and international law, Navy vessels are required to use all means available in restricted visibility, including MFAS and positioning of additional lookouts, to provide heightened vigilance to avoid collision. The *International Navigation Rules of the Road* considers periods of fog, mist, falling snow, heavy rainstorm, sandstorms, or any similar events as "restricted visibility." In restricted visibility, all mariners, including Navy vessel crews, are required to maintain proper lookout by sight and hearing as well as "by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision." Prohibiting or limiting vessels from using sensors like MFAS during periods of restricted visibility violates international navigational rules, increases navigational risk, and jeopardizes the safety of the vessel and crew.

Surface ducting occurs when water conditions (e.g., temperature layers, lack of wave action) result in sound energy emitted at or near the surface to be refracted back up to the surface, then reflected from the surface only to be refracted back up to the surface so that relatively little sound energy penetrates to the depths that otherwise would be expected. This increases active detection ranges in a narrow layer near the surface, but decreases active sonar detection below the thermocline, a phenomenon that submarines have long exploited. Significant surface ducts are conditions under which ASW training must occur to ensure Sailors learn to identify these conditions, how they alter the abilities of MFA sonar systems, and how to deal with the resulting effects on MFA sonar capabilities. To be effective, the complexity of ASW requires the most realistic training possible. Reducing power in significant surface ducting conditions undermines training realism, and is, therefore, impracticable.

#### *Delayed Restart of MFAS after Shutdown or Powerdown:*

*Benefit to Marine Mammals/Effectiveness of Measure*

NMFS' assessment indicates that expanding the delay (until sonar can be restarted after a shutdown due to a marine mammal sighting) for deep-diving species adds minimal protective value for the following reasons:

- The ability of an animal to dive longer than the required shutdown time does not mean that it will always do so. Therefore, the additional delay would only potentially add value in instances when animals had remained under water for longer than the shutdown time required.
- Navy vessels typically move at 10-12 knots (5-6 m/sec) when operating active sonar and potentially much faster when not. Fish and Lauder (2006) measured speeds of 7 species of odontocetes and found that they ranged from 1.4–7.30 m/sec. Even if a vessel was moving at the slower typical speed associated with active sonar use, an animal would need to be swimming near sustained maximum speed for an hour in the direction of the vessel's course to stay within the safety zone of the vessel (i.e., to be in danger of being exposed to levels of sonar associated with injury or TTS).
- Additionally, the times when marine mammals are deep-diving (i.e., the times when they are under the water for longer periods of time) are the same times that a large portion of their motion is in the vertical direction, which means that they are far less likely to keep pace with a horizontally moving vessel.
- Given that, the animal would need to have stayed in the immediate vicinity of the sound source for an hour and considering the maximum area that both the vessel and the animal could cover in an hour, it is improbable that this would randomly occur. Moreover, considering that many animals have been shown to avoid both acoustic sources and ships without acoustic sources, it is improbable that a deep-diving cetacean (as opposed to a dolphin that might bow ride) would

choose to remain in the immediate vicinity of the source. It is unlikely that a single cetacean would remain in the safety zone of a Navy sound source for more than 30 minutes.

- Last, in many cases, the lookouts are not able to differentiate species to the degree that would be necessary to implement this measure. Plus, Navy operators have indicated that increasing the number of mitigation decisions that need to be made based on biological information is more difficult for the lookouts (because it is not their area of expertise).

*Practicability of the Measure*

When there is an artificial break in the exercise (such as a shutdown) the flow of the exercise is lost and several hours of training may be wasted, depending on where the Navy was in the exercise. An increase in the delay of MFAS use that occurs during an exercise will likely further negatively affect the effectiveness of the military readiness training because it will be harder to regain the flow of the exercise the longer the equipment and personnel are on hold. Moreover, lengthening a delay in training necessitates a continuation of the expenditure of resources (operation of all of the equipment and personnel), while not making progress towards the accomplishment of the mission (training completion).

***Halting of MFAS Use in the Event of a Marine Mammal Injury or Death (and Stranding) until Cause is Determined:***

*Benefit to Marine Mammals/Effectiveness of Measure*

Only in a very small portion of incidents (such as when a ship strikes a whale and personnel realize it immediately) is the cause of marine mammal injury or death immediately known. Halting MFAS use in the event of a marine mammal stranding may have only a very limited immediate benefit to marine mammals if animals have stranded and are still in the water and are within a certain distance of a Navy sound source(s) (not to imply that the Navy source would be assumed to have caused the event), i.e., it is physically possible for them to be exposed to received levels of sound that could potentially result in an additional adverse effects. In this case, cessation of sonar may alleviate additional stress to an animal that is already in a compromised physical state. However, if stranded animals are dead or on the beach, the benefit of a cessation of sonar does not exist as neither dead nor beached animals can benefit from it. The Navy only plans to conduct approximately 678 hours of hull-mounted MFAS activity annually in the TMAA. The Navy will be required (by the MMPA authorization) to notify NMFS immediately if an injured, stranded, or dead marine mammal is found during or shortly after, and in the vicinity of, any Navy training exercise utilizing MFAS, HFAS, or at-sea explosions taking place within the TMAA.

*Practicability of the Measure*

Investigations into the causes of stranding events often take months or years and the most probable outcome is that a definitive determination of cause is not made. Despite the fact that the Navy has been conducting thousands of hours of sonar, each, in southern California, the Pacific Northwest, around Hawaii, and off the east coast of the U.S. for multiple years, NMFS and the Navy have concluded that only 5 strandings worldwide (and not in the areas mentioned) can be associated with MFAS use. It is impracticable to halt the use of MFAS while the cause of a stranding is determined.

***Ramp Up of Sonar Source Prior to Full Power Operation:***

*Benefit to Marine Mammals/Effectiveness of Measure*

Based on the evidence that some marine mammals avoid sound sources, such as vessels, seismic sources, or MFAS (Richardson et al. 1995, Southall et al. 2007, and DoN 2008), the theory behind the ramp-up is that animals would move away from a sound source that was ramped up starting at low energy, which would result in the animals not being suddenly exposed to a more alarming, or potentially injurious sound. Compton et al. (2008) noted that this response has not been empirically demonstrated, that the effectiveness of the measure would likely vary between species and circumstances, and that the

effectiveness of the measure should be the focus of further research (i.e., controlled exposure experiments). The implicit assumption is that animals would have an avoidance response to the low power sonar and would move away from the sound and exercise area; however, there is no data to indicate this assumption is correct. The Navy is currently gathering data and assessing it regarding the potential usefulness of this procedure as a mitigation measure. With seismic surveys, which have relatively large safety zones compared to MFAS (and for which NMFS estimates that injury can occur at greater distances from the source than MFAS), NMFS utilizes ramp-up as a cautious mitigation measure to reduce Level B harassment and help ensure that Level A harassment does not occur.

*Practicability of the Measure*

Ramp-up procedures are not a viable alternative for MFA sonar training events as the ramp-up would alert opponents to the participants' presence, thus undermining training realism and effectiveness of the military readiness activity. When a MFA sonar ship turns its sonar on, area submarines are alerted to its presence. A submarine can hear an active sonar transmission farther away than the surface ship can hear the echo of its sonar off the submarine. Ideally, the surface ship will detect the submarine in time to attack the submarine before the submarine can attack one of the ships of the Strike Group (noting, of course, that attacks during training events are not actual attacks). If the MFA sonar ship starts out at a low power and gradually ramps up, it will give time for the submarine to take evasive action, hide, or close in for an attack before the MFA sonar is at a high enough power level to detect the submarine. Additionally, using these procedures would not allow the Navy to conduct realistic training, or "train as they fight," thus adversely impacting the effectiveness of the military readiness activity. Ramp up would constitute additional unnecessary sound introduced into the marine environment, in and of itself constituting harassment and this measure does not account for the movement of the ASW participants over the period of time when ramp up would be implemented.

***Enlargement or Modification of Powerdown/Shutdown Zones of Hull-mounted Sonar:***

*Benefit to Marine Mammals/Effectiveness of Measure*

The current power down and shut down zones are based on scientific investigations specific to MFA sonar for a representative group of marine mammals. They are based on the source level, frequency, and sound propagation characteristics of MFA sonar. The zones are designed to preclude direct physiological effect from exposure to MFA sonar. Specifically, the current power-downs at 500 yards and 1,000 yards, as well as the 200 yard shut-down, were developed to minimize exposing marine mammals to sound levels that could cause TTS and PTS. The underlying received levels of sound that were used to determine the appropriate safety zone distances are based on: for TTS - empirical information gathered on the levels at which the onset of noise-induced loss in the hearing sensitivity of captive cetaceans occurs, and, for PTS – extrapolations from the cetacean TTS data that incorporate TTS growth data from terrestrial animals. NMFS has determined that these measures effectively accomplish this.

Enlargement of the powerdown or shutdown zones would primarily result in the further reduction of the maximum received level that the detected animal might be exposed to, which could potentially mean that an animal expected to respond in a manner NMFS would classify as level B harassment could potentially either respond in a less severe manner or maybe not respond at all. This could be more important at an important time or place or in the presence of species or age-classes of concern (such as beaked whales). NMFS has received varying recommendations regarding the potential size of an expanded powerdown or shutdown zone, including 2 km, 4 km, or the 154 dB isopleth. As noted below, the ability of the lookouts to effectively monitor the safety zone decreases as the distance to the edge of the zone increases and the area that it is necessary to monitor increases by a factor of 4 as the distance to the edge doubles.

A review of the Navy's post-exercise reports shows lookouts have not reported any observed response of marine mammals at any distance.

*Practicability of the Measure*

The outer safety zone the Navy has developed (1000 yd) is also based on a lookout's ability to realistically maintain situational awareness over a large area of the ocean, including the ability to detect marine mammals at that distance during most conditions at sea. Requirements to implement procedures when marine mammals are present well beyond 1,000 yards dictate that lookouts sight marine mammals at distances that, in reality, are not always possible. These increased distances also significantly expand the area that must be monitored to implement these procedures. For instance, if a power down zone increases from 1,000 to 4,000 yards, the area that must be monitored increases sixteen-fold. Increases in safety zones are not based in science, provide limited benefit to marine mammals and severely impact realistic ASW training by increasing the number of times that a ship would have to shut down active sonar, impacting realistic training, and depriving ships of valuable submarine contact time. Commanders participating in training designed for locating, tracking, and attacking a hostile submarine could lose awareness of the tactical situation through increased stopping and starting of MFA sonar leading to significant exercise event disruption. Increased shutdowns could allow a submarine to take advantage of the lapses of active sonar, and position itself for a simulated attack, artificially changing the reality of the training activity. Given the operational training needs, increasing the size of the safety range is generally impracticable.

***Expansion of Exclusion Area Delineated for Use with Explosive Detonations:***

*Benefit to Marine Mammals/Effectiveness of Measure*

As described previously, the current designated exclusion zones for three exercise types (SINKEX, BOMBEX, and MISSILEX) are not large enough to prevent TTS should one of the largest explosives (MK-82 or Harpoon) detonate while the animal is at some distance outside of the exclusion zone. If the exclusion zone were enlarged, the Navy could theoretically reduce the number of TTS takes that might occur – however, anticipated takes by TTS are already very low, and the exclusion zones are more than large enough to avoid injury from all charges.

*Practicability of the Measure*

As mentioned above, SINKEXs have associated range clearance procedures that cover a circle with a radius of either 2 nm (though the exclusion zone is only 1 nm), 1,645 m, or 914 m. Enlarging these circles to encompass the TTS isopleths for these exercise means doubling the radius of the exclusion zones (or more), which would mean that an area 4 times the size would need to be monitored. Generally speaking, the Navy could do this in one of two ways: they could either use the same amount of resources to monitor the area that is 4 times larger, which could potentially result in less focus on the center area that is more critical (because more severe effects are expected closer to the source where the received level would be louder), or they could maintain the same level of coverage by increasing the resources used for monitoring by four times (or more), which is not practicable considering the limited anticipated protective value of the measure.

***Monitoring of Explosive Exclusion Area During Exercises:***

*Benefit to Marine Mammals/Effectiveness of Measure*

The Navy's SINKEX and BOMBEX measures currently require that the Navy survey a safety zone prior to an exercise, and then during the exercise when feasible. Additionally, passive acoustic means are used to detect marine mammals during the exercise. Continuous monitoring during an explosive exercise could potentially decrease the number of animals exposed to energy or pressure levels associated with take. However, one could assume that animals would continue to avoid the area to some degree if continuous explosions were occurring in the areas.

Of note, aside from SINKEXs, training events involving explosives are generally completed in a short amount of time. For smaller detonations such as those involving underwater demolitions training, the area is observed to ensure all the charges detonated and that they did so in the manner intended; however, it is not possible to have visual contact 100 percent of the time for all explosive in-water events. The Navy must clear all people from the explosive zone of influence prior to an in-water explosive event for the safety of personnel and assets. If there is an extended break between clearance procedures and the timing of the explosive event, clearance procedures are repeated.

*Practicability of the Measure*

There are potentially serious safety concerns associated with monitoring an area where explosions will occur and the Navy must take those into consideration when determining when monitoring during an exercise is feasible. While the Navy's measures allow for some monitoring during explosive exercises, it is not practicable to do all of the time.

***Using MFA and HFA Sonar with Output Levels as Low as Possible Consistent with Mission Requirements or Using Active Sonar Only When Necessary:***

Operators of sonar equipment are trained to be aware of the environmental variables affecting sound propagation. In this regard, the sonar equipment power levels are always set consistent with mission requirements. Active sonar is only used when required by the mission since it has the potential to alert opposing forces to the sonar platform's presence. The Navy remains committed to using passive sonar and all other available sensors in concert with active sonar to the maximum extent practicable consistent with mission requirements.

***Scaling Down Training to Meet Core Aims:***

As with each Navy range complex, the primary mission of the ATA is to provide a realistic training environment for naval forces to ensure that they have the capabilities and high state of readiness required to accomplish assigned missions. Modern war and security operations are complex. Modern weaponry has brought both unprecedented opportunity and innumerable challenges to the Navy. Smart weapons, used properly, are very accurate and actually allow the military Services to accomplish their missions with greater precision and far less destruction than in past conflicts. But these modern smart weapons are very complex to use. U.S. military personnel must train regularly with them to understand their capabilities, limitations, and operation. Modern military actions require teamwork between hundreds or thousands of people, and their various equipment, vehicles, ships, and aircraft, all working individually and as a coordinated unit to achieve success. These teams must be prepared to conduct activities in multiple warfare areas simultaneously in an integrated and effective manner. Navy training addresses all aspects of the team, from the individual to joint and coalition teamwork. Training events are identified and planned because they are necessary to develop and maintain critical skills and proficiency in many warfare areas. Exercise planners and Commanding Officers are obligated to ensure they maximize the use of time, personnel and equipment during training. The level of training expressed in the Proposed Action and alternatives is essential to achieving the primary mission of the ATA.

***Limiting the Active Sonar Event Locations:***

Areas where events are scheduled to occur are carefully chosen to provide for the safety of events and to allow for the realistic development of the training scenario including the ability of the exercise participants to develop, maintain, and demonstrate proficiency in all areas of warfare simultaneously. Limiting the training event to a few areas would have an adverse impact to the effectiveness of the training by limiting the ability to conduct other critical warfare areas including, but not limited to, the ability of Navy ships to defend themselves from threats on the surface and in the air while carrying out other activities. Limiting the exercise areas would concentrate all active sonar use, resulting in unnecessarily prolonged and intensive sound levels rather than the more transient exposures predicted by

the current planning that makes use of multiple exercise areas. Furthermore, exercises using integrated warfare components require large areas of the littorals and open ocean for realistic and safe training.

#### *Implementing Vessel Speed Reduction:*

Vessels engaged in training use extreme caution and operate at a slow, safe speed consistent with mission and safety. Ships and submarines need to be able to react to changing tactical situations in training as they would in actual combat. Placing arbitrary speed restrictions would not allow them to properly react to these situations. Training differently than that which would be needed in an actual combat scenario would decrease training effectiveness and reduce the crew's abilities.

The majority of the ships participating in training activities in the TMAA have a number of advantages for avoiding ship strikes as compared to most commercial merchant vessels. These include the following: (1) Navy ships have their bridges positioned forward, offering good visibility ahead of the bow; (2) Crew size is much larger than that of merchant ships, allowing for more potential observers on the bridge; (3) Dedicated lookouts are posted during a training activity scanning the ocean for anything detectable in the water; anything detected is reported to the Officer of the Deck; (4) Navy lookouts receive extensive training including Marine Species Awareness Training designed to provide marine species detection cues and information necessary to detect marine mammals; and (5) Navy ships are generally much more maneuverable than commercial merchant ships.

#### *Restricting the Use of MFA Sonar During ASW Training Events While Conducting Transits Between Islands (i.e., Choke-points):*

This restriction is not applicable to training in the TMAA. A chokepoint is a strategic strait or canal. Although there are over 200 major straits around the world, only a handful are considered to be strategic "chokepoints," such as the Strait of Gibraltar, Panama Canal, Strait of Magellan, Strait of Malacca, Bosporus and Dardanelles, Strait of Hormuz, Suez Canal, and Bab el Mandeb. While chokepoints are relatively few in number, significant quantities of international commerce and naval shipping move through these chokepoints, making them strategically important to the United States because a single quiet diesel submarine can position itself in the chokepoint and effectively block access beyond that point. The primary similarity of these chokepoints is lengthy shorelines that restrict maneuverability. The longer and more narrow the passage, the more likely the chokepoint creates an area of restricted egress for marine mammals. However these features are not present in the areas of the TMAA in which the Navy plans to conduct sonar training.

#### *Adopting Mitigation Measures of Foreign Nation Navies:*

The Navy typically operates in a Strike Group configuration where the group focuses its efforts on conducting air strikes and/or amphibious operations ashore. This requires that the Navy train to what it calls "integrated warfare" meaning that Strike Groups must conduct many different warfare areas simultaneously. These include the ability to defend itself from attacks from submarines, mines, ships, aircraft and missiles. Other nations do not possess the same integrated warfare capabilities as the United States. As a result, many foreign nations' measures are focused solely on reducing what they perceive to be impacts involving ASW. They are not required to locate training areas and position naval forces for the simultaneous and integrated warfare elements that the Navy conducts. As a result, many nations are willing to move training to areas where they believe marine mammals may not exist and do not train in the same bathymetric and littoral environments.

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